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Vol. 14

PROGRAMME

Programme

14 INTERNATIONAL CONGRESS OF ENTOMOLOGY



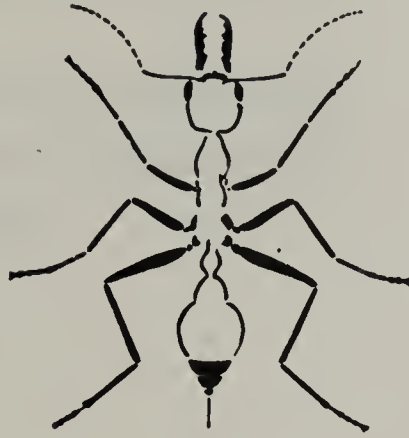
CANBERRA

AUSTRALIA

22-30 AUGUST 1972

L. J. Stannard

PROGRAMME



14 INTERNATIONAL CONGRESS OF ENTOMOLOGY

SPONSORS:

The Australian Academy of Science
The Australian Entomological Society

At the Australian National University
Canberra

22 - 30 August, 1972

THE CONGRESS SYMBOL

Myrmecia gulosa (Fabricius), the red bulldog ant, symbol of the Congress, was described in the classic "Systema Entomologiae". In that work Fabricius published the first formal descriptions of Australian insects and named some 210 species collected by Banks and Solander in 1770, during Cook's first voyage around the world.

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14 INTERNATIONAL CONGRESS OF ENTOMOLOGY

CANBERRA, 1972

Patron:

HIS EXCELLENCY THE RIGHT HONOURABLE SIR PAUL HASLUCK
G.C.M.G., G.C.V.O., K.St.J.

Governor-General of the Commonwealth of Australia

President:

Dr D. F. WATERHOUSE, C.M.G., F.R.S., F.A.A.

Secretary:

Dr C. N. Smithers

Treasurer:

Professor A. J. Birch, F.R.S., F.A.A.

Organizing Committee:

Dr D. F. Waterhouse (Chairman)

Dr C. N. Smithers (Secretary)

Professor A. J. Birch

Dr P. B. Carne

Dr D. H. Colless

Mr P. D. O'Connor

Mrs B. M. Lowe

University Accommodation:

Mr P. D. O'Connor

Hotel Accommodation:

Mrs B. M. Lowe

Local Transport:

Mr J. B. McCabe

Tours:

Mr M. S. Upton

Films and Exhibitions:

Dr R. W. Taylor

Publicity:

Dr K. R. Norris

Meeting Rooms and Projection Facilities

Mr R. S. McInnes
Mr C. N. Lourandos

Entertainment:

Dr P. B. Carne

Catering:

Mr K. J. Thrift
Mr J. Womersley

Information Officer:

Mr R. G. Lukins

Secretariat:

Mrs P. Maund

Ladies' Committee:

Mrs D. F. Waterhouse (Chairman)	
Mrs E. B. Britton	Mrs R. G. Lukins
Mrs D. H. Colless	Mrs E. F. Riek
Mrs M. F. C. Day	Mrs C. N. Smithers
Mrs T. D. C. Grace	Mrs M. S. Upton

**PERMANENT COMMITTEE
OF
INTERNATIONAL CONGRESSES OF ENTOMOLOGY**

Dr S. L. Tuxen (Denmark)	<i>President</i>
Professor M. S. Ghilarov (USSR)	<i>Vice President</i>
Dr P. Freeman (UK)	<i>Secretary</i>
Dr J. C. de M. Carvalho (Brazil)	
Dr J. Ghesquière (Belgium)	
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Dr C. H. Lindroth (Sweden)	
Dr R. Pal (India)	
Dr G. Richard (France)	
Dr C. W. Sabrosky (USA)	
Professor K. E. Schedl (Austria)	
Professor W. Tischler (Germany)	
Dr D. F. Waterhouse (Australia)	
Professor K. Yasumatsu (Japan)	

HONORARY MEMBERS
OF
CONGRESSES OF ENTOMOLOGY

Professor J. Chester Bradley	(USA)
Professor P. P. Grassé	(France)
Dr K. Holdhaus	(Austria)
Mr N. D. Riley	(UK)

OFFICIAL AGENTS

<i>International Airlines:</i>	QANTAS AIRWAYS
<i>Internal Airline, Tour and Travel Consultants:</i>	ANSETT AIRLINES OF AUSTRALIA
<i>Bank:</i>	COMMONWEALTH BANKING CORPORATION
<i>Car Hire:</i>	AVIS-RENT-A-CAR

CONGRESS SYMPOSIA AND ORGANIZERS

1. *CLASSIFICATION AND PHYLOGENY* – Dr E. B. Britton
2. *GENETIC ANALYSIS OF SPECIATION MECHANISMS* – Professor M. J. D. White
3. *THE USE OF GENETICS IN INSECT CONTROL* – Dr M. J. Whitten
4. *INSECTICIDE RESISTANCE* – Mr R. W. Kerr
5. *REGULATION OF INSECT DEVELOPMENT* – Dr D. Gilmour
6. *INTERACTIONS BETWEEN ARTHROPODS AND THEIR HOSTS* – Dr R. M. M. Traynier
7. *EXPERIMENTAL ANALYSIS OF INSECT BEHAVIOUR* – Dr L. B. Barton Browne
8. *PHEROMONES* – Dr R. J. Bartell
9. *QUANTITATIVE EVALUATION OF NATURAL ENEMY EFFECTIVENESS* – Dr R. D. Hughes
10. *EVOLUTION IN THE HAWAIIAN DROSOPHILIDAE* – Dr D. E. Hardy
11. *THE SUPPRESSION OF INSECT POPULATIONS BY THE RELEASE OF STERILE INDIVIDUALS* – Dr M. A. Bateman
12. *PROSPECTS FOR PHYSICAL CONTROL OF INSECTS* – Mr S. W. Bailey
13. *ENTOMOLOGY AND THE MANAGEMENT OF MAN'S ENVIRONMENT* – Dr L. R. Clark
14. *THE SUBSTANCE OF MANAGEMENT: CHANGE AND STABILITY IN POPULATIONS OF INSECTS* – Dr P. W. Geier
15. *STUDY OF ECOLOGICAL SYSTEMS AND MODELS FOR USE IN POPULATION MANAGEMENT* – Dr D. P. Clark
16. *THE SYSTEMS APPROACH TO INSECT PEST MANAGEMENT – A DEVELOPING PROGRAMME IN THE UNITED STATES OF AMERICA* – Dr P. W. Geier
17. *INTEGRATED CONTROL—WHAT? WHY? HOW? WHEN?* – Dr P. W. Geier

18. *INSECTICIDES AND THE ENVIRONMENT* – Dr D. F. Waterhouse
19. *AN ASSESSMENT OF THE CURRENT STATUS AND PROSPECTS FOR THE CONTROL OF ARTHROPODS OF MEDICAL AND VETERINARY IMPORTANCE* – Dr R. H. Wharton
20. *AGRICULTURAL ENTOMOLOGY IN DEVELOPING COUNTRIES* – Mr G. Pasfield
21. *ENTOMOLOGY OF MAJOR CHANGES IN LAND USE* – Mr T. V. Bourke

NOTE: CONGRESS SYMPOSIA NUMBERS 13–17 HAVE BEEN DESIGNED AND ARRANGED TO FORM A SERIES EXAMINING THE THEME: “POPULATION MANAGEMENT AND INTEGRATED CONTROL”.

CONGRESS SECTIONS AND CONVENORS

1. *TAXONOMY, MORPHOLOGY, ZOOGEOGRAPHY, PALAEONTOLOGY* – Dr E. B. Britton
2. *GENETICS* – Dr M. J. Whitten
3. *PHYSIOLOGY, CYTOLOGY, FINE STRUCTURE* – Dr A. C. S. Crossley
4. *BEHAVIOUR* – Dr L. B. Barton Browne
5. *BIOCHEMISTRY* – Dr D. Gilmour
6. *ECOLOGY* – Professor T. O. Browning
7. *BIOLOGICAL CONTROL AND INSECT PATHOLOGY* – Dr. E. McC. Callan
8. *NON-INSECTICIDAL CONTROL* – Dr R. J. Bartell
9. *POPULATION MANAGEMENT AND INTEGRATED CONTROL* – Dr P. W. Geier
10. *TOXICOLOGY, RESISTANCE AND SIDE EFFECTS OF INSECTICIDES* – Mr J. T. Snelson

11. *MEDICAL AND VETERINARY ENTOMOLOGY* – Dr R. H. Wharton,
Mr M. D. Murray and Dr J. H. Oliver
12. *AGRICULTURAL ENTOMOLOGY* – Mr G. Pasfield
13. *FOREST ENTOMOLOGY* – Dr F. D. Morgan
14. *STORED PRODUCTS ENTOMOLOGY* – Dr B. R. Champ and Mr. S. W.
Bailey
15. *TROPICAL ENTOMOLOGY* – Mr T. V. Bourke

GENERAL INFORMATION

CONGRESS CENTRE

The Congress Centre is at the Australian National University and consists of:—

1. *Registration Centre*, in Melville Hall, and
2. *Congress Office*, in nearby Haydon-Allen Building.

The Registration Centre will be open at the following times:

Monday, 21 August: 0900 — 1930 hours

Tuesday, 22 August: 0900 — 1600 hours

Wednesday, 23 to Friday, 25 August: 0900 — 1730 hours

Saturday, 26 August: 0900 — 1200 hours

Thereafter the Registration Centre will move to the Congress Office area.

The Congress Office will be open at the following times:

Monday, 21 to Friday, 25 August: 0900 — 1730 hours

Saturday, 26 August: 0900 — 1200 hours

Monday, 28 to Wednesday, 30 August: 0900 — 1730 hours.

Telephone Numbers:

ENQUIRIES: Melville Hall.47-6125

Congress Office. . . . 47-6151

CONGRESS OFFICIALS

Congress Officials can be recognized by the gold ribbon attached to their name tags.

SERVICES

The following services are available at the Congress Centre:—

In Melville Hall

- Registration desk
- Information Desk
- Ladies' Committee Desk
- Lounge
- Australian Entomological Society's Desk
- Late Enrolment Facilities
- Finance Officer
- Souvenir Sales Desk
- Visual Aids Consultant
- Concert Ticket Sales
- Interpreters

In Copland Building

- Bank
- International Airline Office (Qantas)
- Internal Airline and Tours Office (Ansett)
- New Zealand Entomological Society's Office

In Haydon-Allen Building

- Congress Office
- Post Office
- Writing Room (Room S)
- Mail and Message Rack (in Post Office)
- Membership Lists
- Symposium Organizers' Office (Room Y)
- Section Convenors' Office (Room Y)
- Visual Aids Office (Room Y)
- Slide and Film collecting point (Room Y)

The rooms in which these services are available are all signposted.

MEETING ROOMS

(See map p. 82)

The *OPENING PLENARY SESSION* will be held at 1500 hours on Tuesday, 22 August in the Canberra Theatre, Civic Square, Canberra City. Members must be seated by 1430 hours. Buses will leave the Congress Centre at intervals from 1330 hours and return after the session.

The *CLOSING PLENARY SESSION* will be held at 1015 hours on Wednesday, 30 August in the Canberra Theatre, Civic Square, Canberra City. Buses will leave Halls and Motels from 0930 hours.

SYMPOSIA AND SECTION MEETINGS will be held at the Australian National University. The rooms to be used are all signposted and are indicated by letters of the alphabet as follows:

ROOMS	LOCATION
A, B, C, D, E	Copland Building
F, S, T, U, V, W, X, Y, Z	Haydon-Allen Building
G, R	Geology Building
H, I	Chemistry Building
J	Research School of Chemistry
K, L, M	Physics Building
N	H.C. Coombs Building
O	Law School
P, Q	Forestry Building
CS	Plant Industry, CSIRO

FILM AND SLIDE PROGRAMMES will be screened in the Theatre in the Forestry building (Room P) (see p. 144)

MEMBERS' EXHIBITS are displayed in the Laboratory in the Geology building (Room R) (see p. 147)

COMMERCIAL EXHIBITS are displayed in the Laboratory in the Forestry building (Room Q) (see p. 154)

MEETING ROOMS FOR INFORMAL DISCUSSIONS are available and members wishing to use one of these should enquire at the Congress Office.

LOUNGES

The lounges of the University residential Halls and the Students' Union may be used by Congress Members.

PHOTOGRAPHS

Photographs taken by the Congress photographer, and available for purchase by members, will be on view in the foyer of the Haydon-Allen Building, near the Congress Office.

TEA AND COFFEE

Tea and coffee will be served at points near the meeting rooms from 1030 to 1100 hours and from 1520 to 1550 hours.

DINNER AT HALLS OF RESIDENCE

Will residents please note that the managers at the Halls have agreed to serve dinner at night up to 1845 hours as a special concession to Congress members, but that is the latest time at which diners can present themselves.

LUNCH

The UNIVERSITY UNION serves lunch each day at reasonable prices. HALLS can take a limited number of extra diners provided that their offices are informed before 1100 hours each day.

LIST OF MEMBERS

A list of members is available for consultation in the foyer of the Haydon-Allen Building. This list will also indicate the Motel or Hall in which visitors are accommodated.

LETTER AND MESSAGE RACK

Members may collect their mail from the letter rack in the Post Office. You are invited to use the same racks for messages to other members.

Members with private accommodation arrangements in Canberra should remember to check the rack for messages.

DAILY BULLETIN

A Daily Bulletin of information will be issued. This will contain information on programme changes, transport arrangements and other matters relating to the day-to-day organization of the Congress. Copies will be available in Halls, Motels and the Congress Office. **THIS BULLETIN SHOULD BE CONSULTED EACH DAY.**

RESTAURANTS

There are many restaurants in the Civic Centre in Canberra. Some are listed below for your convenience:—

BACCHUS TAVERN City Mutual Building, Hobart Place, City.
Open 1200 — 1500, 1800 to midnight. No
Lunch Saturday. Closed Sunday.

THE BALCONY ROOM Playhouse, Civic Square, City.
Open 1200 — 1500 hours, 1830 hours to
midnight. Closed Sunday.

**CHANTILLY
RESTAURANT** London Circuit, City.
Open 1200 — 1430 hours, 1800 hours to
midnight. No lunch Saturday. Closed Sunday.

**CHESTER FORD
RESTAURANT** Travelodge Motel, 74 Northbourne Avenue,
Braddon.
Open 0700 — 0900, 1200 — 1400, 1800—
2200 hours.

CHOPSTICKS London Circuit, City.
Open 1200 — 1400, 1730 — 2330 hours,
No lunch Saturday. Sunday 1730 — 2200
hours.

**FOUR FESTIVALS
RESTAURANT** Parkroyal Motel, Northbourne Ave, Braddon.
Open 1200 — 1400, 1800 — 2130 hours.

**L'ARLEQUIN
RESTAURANT** Ground floor, Tasman House, Hobart Place,
City.
Open 1200 — 1430, 1730 — 2200 hours.
No lunch Saturday. Closed Sunday.

NOAH'S RESTAURANT Town House Motel, Rudd Street, Turner.
Open 1200 — 1400, 1830 — 2200 hours
except Sunday to 2130 hours.

MORE MODESTLY PRICED:

**CHARLIE'S
RESTAURANT** Bunda Street, City.
Open 1200 — 1400, 1800 — 2130 hours. No
lunch Saturday. Closed Sunday.

GUS' ALOUETTE 5 Bunda Street, City.
Open 1700 hours to midnight.

DOWN UNDER RESTAURANT	East Row, City. Open 1800 — 2100 hours except Friday to midnight. (Operates as a discotheque on Saturday)
WOODSTOCK RESTAURANT	Alinga Street, City. Open 1200 — 2100 hours and 2130 hours Friday and Saturday.
HAPPY'S RESTAURANT	Garema Place, City. Open 1200 — 1500, 1700 — 2300 hours Friday and Saturday to midnight. Sunday to 2200 hours.
PIZZERIA, THE HOUSE OF PIZZA	Garema Arcade, Garema Place, City. Open daily 1000 — 2100 hours. Thursday, Friday, Saturday to 2200 hours.
TAVERNA RESTAURANT	Garema Place, City. Open 1100 hours to midnight daily except Tuesdays.
ZORBA'S RESTAURANT	Petrie Street, City. Open 1100 — 1500, 1700 hours to midnight. Sunday from 1700 hours to midnight only.

BANKING AND FOREIGN EXCHANGE FACILITIES

An office of the Commonwealth Trading Bank has been set up in the Copland Building.

TRAVEL BUREAU

There is a Travel Bureau in the Copland Building.

Representatives of Qantas Airways and Ansett Airlines of Australia will be in attendance from 0900 to 1730 hours daily except for Saturday and Sunday. Confirmation of air travel bookings and tour arrangements may be made at this office.

CAR HIRE

Avis Rent-A-Car, 4 Lonsdale Street, Braddon (Telephone: 496088), has agreed to allow 10% discount on charges to Congress members.

TAXIS

Taxis are available at the many ranks in the City. It is not usually possible to hail a taxi on the street but one may be obtained by phoning 498411.

POST OFFICE

A Congress Post Office has been established in the Haydon-Allen Building. Mail sent from the Congress Post Office will bear a special Congress cancellation imprint.

MEDICAL ASSISTANCE

If you need medical assistance you should enquire at the Reception Desk at your place of residence or at the Congress Office.

PUBLIC TELEPHONES

Public telephones are conveniently situated in the Haydon-Allen Building, the University Students' Union, Halls and Motels. Long distance calls may be made from those phones equipped to take 5, 10 and 20 cent coins.

WRITING ROOM

A writing room for use by Congress members is available in the Haydon-Allen Building (Room S).

INTERPRETERS

Some assistance from interpreters can be arranged for those needing it. Please enquire at the Information or Interpreters' desks in the Registration Centre in Melville Hall.

SOUVENIR TIE AND SCARF

A limited number of men's ties and ladies' scarves of high quality Australian wool, specially designed for this Congress, will be on sale at the Australian Entomological Society's desk at the Registration Centre in Melville Hall.

Ties: \$2.50

Scarves: \$2.50

The tie material has been made by the new Australian self-twist spinning process.

BUS TRANSPORT

The following special bus services are being provided free of charge for Congress members. *ANY CHANGES TO THE SERVICE WILL BE ANNOUNCED IN THE DAILY BULLETIN.*

MONDAY, 21 August

From 0930 hours buses will run at frequent intervals between motels and the Congress Centre. The last bus will leave the Congress Centre at 1930 hours. This service is being provided in order to assist you to REGISTER EARLY.

TUESDAY, 22 August

1. At 0830 hours buses will leave motels for the Congress Centre.
2. From 1330 hours buses will run at frequent intervals from the Congress Centre to the Canberra Theatre for the Opening Plenary Session. As these buses will be running a shuttle service, you are strongly advised to board the buses as early as possible so as not to cause overcrowding of the later buses.
3. Buses will return to the Congress Centre after the Opening Plenary Session.
4. Buses will leave the Congress Centre for motels at 1930 hours at the end of the Presidential Reception in Melville Hall.

WEDNESDAY, 23 to FRIDAY, 25 August and MONDAY, 28 to TUESDAY, 29 August

1. At 0830 hours buses will leave motels for the Congress Centre.
2. At 1745 hours buses will leave the Congress Centre for motels.
3. Between 0845 and 0915 hours and between 1730 and 1815 hours one bus will run a shuttle service between the Halls and the Congress Centre.

WEDNESDAY, 30 August

1. Buses will leave motels and halls for the Canberra Theatre at 0930 hours.
2. Buses will return to the motels and halls at the close of the Plenary session.

NEW ZEALAND ENTOMOLOGICAL SOCIETY MEETING CHRISTCHURCH, 6–8 September 1972

An officer of the New Zealand Entomological Society will be in attendance in the Copland Building from 1245 to 1400 hours each day except

Saturday 26 and Sunday 27, August. He will be happy to answer any enquiries about the Society's meeting in Christchurch.

Travel arrangements relative to the New Zealand meeting may be made in the same office.

SYMPHONY CONCERT

A special performance by the Canberra Symphony Orchestra has been arranged for the evening of Wednesday, 23 August in the Canberra Theatre, commencing at 2000 hours. Programmes and tickets (\$2.00) may be obtained in the Registration Centre, Melville Hall, up to 1600 hours on the day of the concert. If you intend going, please purchase your tickets AS SOON AS POSSIBLE.

EVENING FUNCTIONS

TUESDAY, 22 August

Presidential Reception for all members in Melville Hall and Students' Union from 1730 – 1930 hours. Invitation cards are in members' envelopes.

WEDNESDAY, 23 August

Special concert by the Canberra Symphony Orchestra in the Canberra Theatre at 2000 hours. Tickets (\$2.00) and programmes are obtainable at the Registration Centre in Melville Hall until 1600.

Thursday, 24 August

Special exhibits presented by the Department of Neurobiology, Australian National University, from 1900 – 2200 hours in the Neurobiology Department (Old Hospital Buildings, marked "6" on map).

MONDAY, 28 August

Special exhibits presented by the Department of Neurobiology, Australian National University, from 1900 – 2200 hours in the Neurobiology Department (Old Hospital Buildings, marked "6" on map).

TUESDAY, 29 August

Congress Dinner for all members in Melville Hall and Students' Union, at 1930 hours. Invitation cards are in members' envelopes.

LADIES' PROGRAMME

The Ladies' Committee has arranged an interesting programme for registered associates and children attending the Congress.

It has endeavoured, by plan or suggestion, to provide a feeling of living, rather than touring, in Canberra.

As well as sightseeing, associates and children will be able to visit nature reserves, cultural and domestic centres, private homes and meet people outside the entomological world.

There is free time for people to pursue their own interests with or without the aid of a hostess and all activities are suitable for children. In general, however, children under 7 would be happier with sitters (at associate's expense) but the nature reserves and sightseeing would have appeal for them.

To participate in the Ladies' Programme it is necessary to ENROL AS AN ASSOCIATE. There is a small charge for some of the activities to cover that portion of cost not covered by Congress subsidy.

ABSTRACTS

No Proceedings of the Congress will be published.

Copies of abstracts of papers to be presented are in the satchels of all full and student members. A report on the Congress will be published in the Journal of the Australian Entomological Society immediately after the Congress and a reprint of this will be sent to full and student members.

The same issue of the Journal will contain the Addresses delivered at the Opening and Closing Plenary Sessions.

ASSOCIATED MEETINGS

The attention of members is drawn to the following meetings which, although not part of the Congress Programme, are being held in association with it.

International Organization of Biological Control

General Assembly, at 2000 hours in Room A (Copland Auditorium) on Friday, 25 August.

Myxomatosis and fleas

Meetings will be held at the CSIRO, on Thursday, 31 August and Friday, 1 September.

Meeting of Hymenopterists

This is being convened by Professor J. van der Vecht.

Meeting of Isopterists

An informal meeting and other activities are being arranged. Contact Dr J. A. L. Watson, Division of Entomology, CSIRO for further information.

Tick Meeting

An informal meeting of tick workers is being held at 2000 hours on Wednesday, 23 August in Room F. Contact Dr R. H. Wharton for further information.

Australian Entomological Society

The fifth Annual General Meeting of the Society will be held at 1700 hours on Monday, 28 August in the Copland Building (Room C).

New Zealand Entomological Society Conference

This will be held at Lincoln College, Christchurch, New Zealand, from 6–8 September. Contact Professor R. Harrison at the Society's desk in the Copland Building for information.

Standing Committee on Pacific Entomology

A meeting will be held at 1245 hours on Friday, 25 August, in the Research School of Chemistry (Room J). All interested are invited to attend.

SMOKING

It is regretted that, as meeting rooms are air conditioned, smoking cannot be permitted.

SCIENTIFIC PROGRAMME

NOTICE TO ALL SPEAKERS

Illustrations

Projection equipment for 35 mm. (2 x 2 inch) slides is available in each meeting room and a projectionist will be on duty to operate the equipment.

If you have slides which are *not 35 mm.* or if you have *cine film* to show please see the Visual Aids Consultant in Melville Hall **IMMEDIATELY.**

Slides or films to be shown as part of a paper must be handed in to the Visual Aids Officer in Room Y (Haydon-Allen Building) on the *day before* you are due to present your paper. They should be collected from the projectionist after the session otherwise they will be taken to the Visual Aids Officer in Room Y.

Presentation of Paper

Chairmen have been instructed to enforce rigidly the time schedule of the programme and speakers are asked to cooperate by being punctual.

Timing for symposia has been arranged in consultation with the Organizers.

Offered papers in the afternoon sessions should not exceed twenty minutes, allowing 15 minutes for delivery and 5 minutes for discussion. If delivery time is exceeded, discussion time will be reduced.

Film and Slide Programmes

The film and slide programmes will be screened in Room P (Forestry Building). Members must be present when their programmes are screened. A projectionist will be on duty to operate the equipment. Members must make sure that material for screening is in the hands of the Visual Aids Officer (Room Y) on the *day before* presentation and must collect it from the projectionist after showing.

(NOTE: To help you plan your activities there is a simple timetable form at the back of this programme.)

DAILY PROGRAMME SUMMARY
TUESDAY 22 AUGUST

AFTERNOON: 1430 hours	TOPIC	ROOM	PAGE
	<u>Opening Plenary Session</u>	Canberra Theatre	34
EVENING: 1730 hours			
	<u>Presidential Reception for all members</u>	Melville Hall and Students' Union	

WEDNESDAY 23 AUGUST

MORNING: 0915 hours	TOPIC	ROOM	PAGE
SYMPOSIUM			
NO			
1	<u>Classification and Phylogeny</u>	A	35
13	Entomology and the Management of Man's Environment	K	50
11	The suppression of insect populations by the re-release of sterile individuals	F	48
2	Genetic analysis of speciation mechanisms	H	36
7	Experimental analysis of behaviour	N	43
AFTERNOON: 1400 hours			
SECTION			
NO			
1	Methodology and use of computers	C	59
2	General session	L	67
3	The structure of the integument ()	J	70

WEDNESDAY 23 AUGUST

AFTERNOON (Cont'd)

SECTION NO	TOPIC	ROOM	PAGE
4+3	The compound eye (I)	K	75
4+6	<u>Migration and dispersal (I)</u>	CS	76
5	Biophysics & biochemistry of insect flight	M	86
6	Communities	N	93
7	Biological control of weeds	O	98
8+4	Insect pheromones	H	103
9	Management of some medical & veterinary pests (from 1400 hours)	A	107
9	A cooperative programme of research into pest management in Australia (from 1630 hours)	A	107
10	Toxicology	D	115
8:00 pm — 11	<u>Ticks</u> John XX 11 J. Com	E	120
11	Mosquitoes	F	119
12	World crop protection	G	128
13	Insect/tree interactions (from 1400 hours)	B	132
13	Biological control of forest pests (from 1550 hours)	B	132
13+12+15	Population damage and assessment	I	133
	Slide programme No. 1	P	146

EVENING: 2000 hours

Symphony Concert
Canberra Theatre

THURSDAY 24 AUGUST

MORNING: 0915 hours

SYMPOSIUM

NO

5

Regulation of insect
development

A

40

14

The substance of manage-
ment: change and stability
in population of insects

K

51

12

Prospects for physical
control of insects

F

49

8

Pheromones

H

44

10

Evolution in the Hawaiian
Drosophilidae

N

47

AFTERNOON: 1400 hours

SECTION

NO

1

Zoogeography

B

60

3

Water relations in insects

J

71

4

General session

L

77

4+3

The compound eye (II)

K

78

4+6

Migration and dispersal (II)

CS

79

5+3

Regulation of insect
development (cont. from
morning)

H

87

6

General session

N

94

7

Specific biological
control projects

O

99

8

General session

C

104

9

Ecology & control of crop
pests (I)

E

109

9

Ecology & control of crop
pests (II)

A

110

THURSDAY 24 AUGUST

AFTERNOON (Cont'd)	TOPIC	ROOM	PAGE
SECTION			
NO			
10	Side effects of insecticides	D	116
11	Behavioural aspects of trapping biting arthropods	F	121
12	Biology & ecology of economic insects	G	129
13+12+15	Integrated control of tree pests	I	134
15	Ants & agriculture in the tropics (I)	M	139
—	Film programme No. 1	P	144

8:00 a.m. Am. Ambassador tour

7:30 p.m. Coccidologists CSIRO

FRIDAY 25 AUGUST

MORNING: 0915 hours	TOPIC	ROOM	PAGE
SYMPOSIUM	<u>Collect in arboretum</u>		
NO			
5	Regulation of insect development (cont.)	A	40
15	Study of ecological systems and models for use in population management	K	52
20	Agricultural entomology in developing countries	F	57
8	Pheromones (cont.)	H	44
4	Insecticide resistance	N	38
AFTERNOON: 1400 hours			
SECTION			
NO			
1	<u>Zoogeography</u>	B	61
2+4	The genetics of insect behaviour	L	68
3	Growth	J	72
4+3	The compound eye (III) (1400 hours)	K	80
4	The experimental analysis of insect behaviour (from 1440 hours)	K	80
5+3	The regulation of insect development (cont. from morning)	H	88
1	Morphology	G	62
6	Populations	N	95
7	General session	O	100
8	General session	C	105
9	Quantitative modelling	E	111

FRIDAY 25 AUGUST

AFTERNOON (Cont'd) SECTION NO	TOPIC	ROOM	PAGE
9	Ecology & the economics of crop pest control	A	112
10	Resistance	D	117
11	The emerging importance of Ceratopogonidae	F	122
13+12+15	Other developments in the control of tree pests	I	135
15	Ants & agriculture in the tropics (II)	M	140
—	Film programme No. 2	P	145

5:30 - Drinks

Dr. Rieck

19 Duffy St.

Ainslie

Sunday 10 am behind CSIRO

MONDAY 28 AUGUST

MORNING: 0915 hours	TOPIC	ROOM	PAGE
SYMPOSIUM			
NO			
6	<u>Interactions between arthropods and their hosts</u>	A	41
17	Integrated Control: What? Why? How? When?	K	54
3	The use of genetics in insect control	F	37
21	Entomology of major changes in land use	H	58
4	Insecticide resistance (cont.)	N	38

AFTERNOON: 1400 hours
SECTION

NO			
1	<u>General session</u>	B	<u>64</u>
1	General session	I	63
2	Application of genetics in insect control	D	69
3	Diapause & parthenogenesis	L	73
4	Experimental analysis of insect behaviour	K	81
5+3	Biochemistry of the cuticle	J	90
5+3	Regulation of insect development (cont.)	H	89
6	The idea of a population	N	96
7	Importance of systematics for biological control	O	101

MONDAY 28 AUGUST

AFTERNOON (Cont'd) SECTION NO	TOPIC	ROOM	PAGE
8	General session	C	106
9	Integrated control in different countries (I)	A	113
11	Reproduction of arthro- pods of medical & veterinary importance	E	123
11	General session	F	124
12	Environmental and pro- duction relationships of economic insects	G	130
14	The distribution of stored products insects (from 1400 hours)	CS	137
	The protection of stored products with chemicals (from 1500 hours)	CS	137
15	General session	M	141
—	Film programme No. 3	P	145

7:30 pm. Acari — Bruce Hall — common Room
(upstairs from Lobby)

TUESDAY 29 AUGUST

MORNING: 0915 Hours	TOPIC	ROOM	PAGE
SYMPOSIUM			
NO			
6	<u>Interactions between arthropods and their hosts (cont.)</u>	A	41
16	The systems approach to insect pest management	K	53
19	An assessment of the current status and prospects for the control of arthropods of medical and veterinary importance	F	56
18	Insecticides and the environment	H	55
9	Quantitative evaluation of natural enemy effectiveness	N	46
AFTERNOON: 1400 hours			
SECTION			
NO			
1	General session	B	65
1	<u>General session</u>	C	66
3	Insect secretions	J	74
4	Experimental analysis of insect behaviour	K	84
4	General session	L	85
5	General session	I	92
5+3	Regulation of insect development (cont.)	H	91
6	Distribution & bionomics	N	97

TUESDAY 29 AUGUST

AFTERNOON (Cont'd) SECTION NO	TOPIC	ROOM	PAGE
7	Insect pathology	O	102
9	Integrated control in different countries (II)	A	114
11	Species complexes in medically important arthropods (from 1400 hours)	E	125
	Taxonomy, biology and genetics in <i>Musca</i> (from 1550 hours)	E	125
11	General session	F	127
12	Patterns of insect control	G	131
13	Symbiotic relationships (1400 hours)	D	136
	<u>Taxonomy and bionomics of forest insects (from 1550 hours)</u>	D	136
14	The biological control of phycitid moths (1400 hours)	CS	138
	General session (from 1550 hours)	CS	138
15	<u>Insect phenology in the tropics (1400 hours)</u>	M	142
	<u>Insect diversity in the tropics (from 1550 hours)</u>	M	142
	Slide programme No. 2	P	146

TUESDAY 29 AUGUST

EVENING: 1930 hours	TOPIC	ROOM
	<u>Congress dinner for all members</u>	Melville Hall and Students' Union

WEDNESDAY 30 AUGUST

MORNING: 1015 hours	TOPIC	ROOM	PAGE
	Closing Plenary Session	Canberra Theatre	143

DETAILED SCIENTIFIC PROGRAMME

OPENING PLENARY SESSION

TUESDAY 22 August

Canberra Theatre

1430 hours

1. Welcome to members, by Dr D. F. Waterhouse and Sir Rutherford Robertson.
2. Formal Opening of the Congress by His Excellency, the Right Honourable Sir Paul Hasluck, G.C.M.G., G.C.V.O., K.St.J., Governor-General of the Commonwealth of Australia.
3. Address by Dr E. F. Knipling: "Entomology and the Management of Man's Environment".

NOTE: Members are asked to be seated by 1430 hours.

SYMPOSIUM 1. CLASSIFICATION AND PHYLOGENY

Organizer: E. B. Britton

Wednesday, 23 August

Room A

Chairman: D. H. Colless

- 0915 Moss, W. W. Phila. Classification and Phylogeny.
- 0945 Brundin, L. Z. Sweden Nature's hierarchy and the biological Chironomids reference system.
- 1015 Discussion
- 1030 Tea break
- 1100 Hennig, W. Germany Comments on recent papers concerning Diptera classification and phylogeny.
- 1130 Johnson, L. A. S. Aust. Science and non-science in systematics. Botanist
- 1200 Discussion Eucalyptuses

SYMPOSIUM 2.

GENETIC ANALYSIS OF SPECIATION MECHANISMS

Organizer: M. J. D. White

Wednesday, 23 August

Room H

Chairman: H. L. Carson

0915 Chairman's introductory remarks.

0920 **Throckmorton, L. H.** Genetic change and speciation in the *virilis* group of *Drosophila*.

0950 **Bush, G. L.** Mechanisms of sympatric host race formation in the true fruit flies (Tephritidae).

1020 Discussion

1030 Tea break

1055 **Craddock, Elysse M.** Chromosomal evolution and speciation in *Didymuria violescens*.

1125 **Key, K. H. L.** Speciation in Australian morabine grasshoppers – taxonomy and ecology.

1200 **White, M. J. D.** Speciation in Australian morabine grasshoppers – cytogenetic evidence.

1230 Discussion

SYMPOSIUM 3.

THE USE OF GENETICS IN INSECT CONTROL

Organizer: M. J. Whitten

Monday, 28 August

Room F

Chairman: G. B. Craig

0915	Pal, R. and La Brecque, G. C.	WHO/ICMR programme of genetic control of mosquitoes in India.
0955	North, D.	Inherited sterility for control of lepidopterous and hemipterous pests.
1030	Tea break	
1100	Foster, G. G.	The development of genetic methods of controlling the sheep blowfly, <i>Lucilia cuprina</i> .
1135	Overmeer, W. P. J.	Production of chromosome mutation strains of <i>Tetranychus urticae</i> Koch for genetic control purposes.
1205	Pathak, M.D.	Genetic resistance in rice plants to pest infestations.
1235	Discussion	

SYMPOSIUM 4. INSECTICIDE RESISTANCE

Organizer: R. W. Kerr

Friday, 25 August

Room N

Chairman: J. Keiding

0915 **Brown, A. W. A.** Status and consequences of resistance.

0955 Discussion

1000 **Busvine, J. R.** The impact of insecticide resistance on
basic and applied science.

1040 Discussion

1045 Tea break

Chairman: G. B. Craig

1115 **Thomson, J. A.** Gene regulation in higher organisms and
its relation to the development of bio-
logical insecticides.

1155 Discussion

1200 **Whitten, M. J.** The potential of genetics in insect control.

1240 Discussion

Monday, 28 August

Room N

Chairman: E. Hodgson

0915 **Smith, J. N.** Detoxication mechanisms.

0955 Discussion

1000 **Burt, P.E.** Factors controlling the process of poison-
ing by topically-applied neurotoxic insecti-
cides.

1045 Discussion

1045 Tea break

Chairman: A. Albert

- | | | |
|------|-------------------|---|
| 1115 | Holan, G. | Design of new insecticides and the mode of action of DDT. |
| 1155 | Discussion | |
| 1200 | Gasser, R. | The future role of chemicals in insect control. |
| 1240 | Discussion | |

SYMPOSIUM 5.

REGULATION OF INSECT DEVELOPMENT

Organizer: D. Gilmour

Thursday, 24 August

Room A

Chairman: D. Gilmour

- 0915 Williams, C. M. Juvenile Hormone: in retrospect and prospect.
- 1000 Wyatt, G. R. Roles of the fat body in regulation and metamorphosis.
- 1045 Tea break

Chairman: J. A. Thomson

- 1115 Davey, K. G. Endocrine control of oogenesis.
- 1200 Discussion
- (For continuation of this Symposium see Section 5 programme)

Friday, 25 August

Room A

Chairman: A. C. S. Crossley

- 0915 Karlson, P. The Ecdysones: Biochemistry and mode of action.
- 1000 Birt, L. M. The role of protein synthesis in holometabolous metamorphosis.
- 1045 Tea break

Chairman: L. Levenbook

- 1115 Fraenkel, G. Mechanism of puparium formation in flies and its hormonal control.
- 1200 Discussion
- (For continuation of this Symposium see Section 5 programme)

SYMPOSIUM 6.

INTERACTIONS BETWEEN ARTHROPODS AND THEIR HOSTS

Organizer: R. M. M. Traynier

Monday, 28 August

Room A

Chairman: J. de Wilde

0915 Chairman's introductory remarks.

0920 Norris, D. M. Host finding: especially by certain
Scolytidae

0945 Discussion

0955 Matsumoto, Y. Some influences of plant chemicals on
insect behaviour.

1020 Discussion

1030 Tea break

1100 Miles, P. W. Chemical warfare between insects and
plants.

1125 Discussion

1135 Mittler, T. E. Influences of plants on aphids.

1200 Discussion

1210 Hocking, B. Interactions between biting flies and their
hosts.

1235 Discussion

Tuesday, 29 August

Room A

Chairman: A. N. Clements

0915 Chairman's introductory remarks.

0920 Hocking Galun, R. Biting Flies & hosts
Behavioural aspects of chemoreception
in blood-sucking arthropods.

0945 Discussion

- 0955 Tatchell, R.J. Interactions between ticks and their hosts.
- 1020 Discussion
- 1030 Tea break
- 1100 Rothschild, M. Interactions between fleas and their hosts.
- 1125 Discussion
- 1135 Vinson, S. B. The chemical basis of relationships between parasitoids and their hosts. *Hymenoptera*
- 1200 Discussion
- 1210 Maslennikova, V. A. Seasonal synchronisation of host-parasite development.
(absent)
- 1235 Discussion

SYMPOSIUM 7.

**EXPERIMENTAL ANALYSIS OF
INSECT BEHAVIOUR**

Organiser: L. B. Barton Browne

Wednesday, 23 August

Room N

Chairman: G. Hoyle

- 0915

Chairman's introductory remarks.
- 0920

Kennedy, J. S.

Changes of responsiveness in the pattern-
ing of behavioural sequences.
- 0950

Dethier, V. G.

Sensory input and the inconstant fly.
- 1020

Discussion
- 1030

Tea break
- 1100

Fraser Rowell, C. H.

Sensory physiology in the central nervous
system of insects and its relation to
behaviour.
- 1130

Miller, P. L.

The analysis of some forms of rhythmical
behaviour.
- 1200

**Riddiford, L. M. and
Truman, J. W.**

Role of hormones in the control of insect
behaviour.
- 1230

Discussion
- 1240

Chairman's closing remarks.

(See also Section 4 programme)

SYMPOSIUM 8. PHEROMONES

Organizer: R. J. Bartell

Thursday, 24 August

Room H

Chairman: R. J. Bartell

- | | | |
|------|---------------|---------------------------------|
| 0915 | Moore, B. P. | General discussion. |
| 0940 | Discussion | |
| 0945 | Shorey, H. H. | Pheromone — mediated behaviour. |
| 1040 | Discussion | |
| 1030 | Tea break | |

Chairman: T. E. Bellas

- | | | |
|------|-------------------|--|
| 1100 | Hölldobler, B. | A new look at homing and recruitment in ants. |
| 1125 | Discussion | |
| 1130 | Renwick, J. A. A. | Aggregation pheromones and their role in the chemical ecology of bark beetles. |
| 1155 | Discussion | |
| 1200 | Barr, B. A. | A bark beetle pheromone research programme. |
| 1230 | Discussion | |

Friday, 25 August

Room H

Chairman: W. D. Seabrook

- | | | |
|------|----------------|---|
| 0915 | Priesner, E. | Pheromone receptors. |
| 0940 | Discussion | |
| 0945 | Roelofs, W. L. | Modulating sex attractancy in Lepidoptera |

1015 Discussion

1030 Tea break

Chairman: G. H. L. Rothschild

1100 **Hummell, H. E.,** Biological activities of insect pheromones
Gaston, L. K. and and parapheromones.
Shorey, H. H.

1125 Discussion

1130 **Tette, J. P.** Pheromones: prospects for control.

1200 Discussion

SYMPOSIUM 9.

QUANTITATIVE EVALUATION OF NATURAL ENEMY EFFECTIVENESS

Organizer: R. D. Hughes

Tuesday, 29 August

Room N

Chairman: J. M. Franz

- | | | |
|------|------------------------------------|---|
| 0915 | Franz, J. M. | Introductory review of the need for evaluation studies in relation to integrated control. |
| 0930 | Kiritani, K. and Dempster, J. P. | Different approaches to the quantitative evaluation of natural enemies. |
| 1010 | Mackauer, M. and van den Bosch, R. | General applicability of evaluation results. |
| 1050 | Tea break | |
| 1115 | Murdoch, W. W. | The functional response of predators. |
| 1155 | Readshaw, J. L. | The numerical response of predators to prey density. |

SYMPOSIUM 10. EVOLUTION IN THE HAWAIIAN
DROSOPHILIDAE

Organizer: D. E. Hardy

Thursday, 24 August

Room N

Chairman: M. J. D. White

- 0915 Hardy, D. E. *Hawaii* Introduction and background information.
- 0945 Carson, H. L. *Hawaii* Ancient chromosomal polymorphism and its use in phylogeny.
- 1015 ♀ Craddock, E. M. *ant.* Degrees of reproductive isolation between closely related species of endemic Hawaiian *Drosophila*.
- 1045 Tea break
- 1115 Spieth, H. T. *Calif* Courtship behaviour of Hawaiian *Drosophila*.
- 1145 Kaneshiro, K. Y. *Hawaii* Phylogenetic relationships of Hawaiian Drosophilidae based upon morphology and ecology.
- 1215 Richardson, R. H. *Texas* Microhabitat and dispersal patterns of three species of *Drosophila* endemic to Hawaii.

**SYMPOSIUM 11. THE SUPPRESSION OF INSECT
POPULATIONS BY THE RELEASE OF
STERILE INDIVIDUALS**

Organizer: M. A. Bateman

Wednesday, 23 August

Room F

Chairman: D. F. Waterhouse

- | | | |
|------|------------------------|---|
| 0915 | Knipling, E. F. | The sterility method of insect suppression — its merits, limitations, progress and problems. |
| 0945 | Craig, G. B. | The comparison of physical, chemical and genetical methods of inducing sterility; the phenomenon of altered fitness in sterilized insects. |
| 1015 | Discussion | |
| 1030 | Tea break | |
| 1100 | McDonald, F. J. | The future of chemical sterilants in entomology; their use against populations in the field; mammalian toxicity and hazards. |
| 1130 | Proverbs, M. D. | Ecology and sterile-release programmes; the measurement of relevant population processes before and during releases; the assessment of results. |
| 1200 | Discussion | |

SYMPOSIUM 12.

PROSPECTS FOR PHYSICAL CONTROL OF INSECTS

Organizer: S. W. Bailey

Thursday, 24 August

Room F

Chairman: A. R. Gilby

- | | | |
|------|-----------------|---|
| 0915 | Agee, H. R. | The use of sound and light to control the bollworm moth. |
| 0945 | Lewis, T. | The manipulation of air movement to control insects in growing crops. |
| 1015 | Belton, P. | The use of sound for insect control. |
| 1045 | Tea break | |
| 1115 | Pratt, J. J. | The control of food-infesting insects by ionizing radiation. |
| 1135 | Callahan, P. S. | Insect response to infra-red radiation and its significance to new control methods. |
| 1155 | Discussion | |

**SYMPOSIUM 13. ENTOMOLOGY AND THE
MANAGEMENT OF MAN'S
ENVIRONMENT**

Organiser: L. R. Clark

Wednesday, 23 August

Room K

Chairman, B. P. Springett

0915 Opening by Chairman

0930 Watt, K. E. F. The goals and the means of resource
management.

1010 Stephen, W. P. Insects as natural resources and tools of
management.

1045 Tea break

1115 Smith, E. H. Insects as a source of knowledge.

1155 Discussion

1230 Conclusion by Chairman

**SYMPOSIUM 14. THE SUBSTANCE OF MANAGEMENT:
CHANGE AND STABILITY IN
POPULATIONS OF INSECTS**

Organizer: P. W. Geier

Thursday, 24 August

Room K

Chairman: Y. Ito

- | | | |
|------|------------------------|--|
| 0915 | Opening by Chairman | |
| 0930 | Bishop, J. A. | The proper study of populations. |
| 1005 | Klomp, H. | Population dynamics, a key to the understanding of integrated control. |
| 1040 | Tea break | |
| 1110 | Crossley, D. A. | On the properties of ecosystems. |
| 1145 | Solomon, M. E. | Ecology in relation to the management of insects. |
| 1220 | Discussion | |
| 1230 | Conclusion by Chairman | |

**SYMPOSIUM 15. STUDY OF ECOLOGICAL SYSTEMS
AND MODELS FOR USE IN
POPULATION MANAGEMENT**

Organizer: D. P. Clark

Friday, 25 August

Room K

Chairman: F. S. Andersen

0915 Opening by Chairman

0930 **Wiegert, R. G.** Modelling ecological systems: lessons from study of a natural thermal community.

1005 **Conway, G. R.** Experience in pest modelling, a review of models, uses and future directions.

1040 Tea break

1110 **Haynes, D. L.** Population management of the cereal leaf beetle.

1145 **Koenig, H. E.** Ecologically and economically compatible pest control.

1220 Discussion

1230 Conclusion by Chairman

**SYMPOSIUM 16. THE SYSTEMS APPROACH TO
INSECT PEST MANAGEMENT – A
DEVELOPING PROGRAMME IN THE
UNITED STATES OF AMERICA**

Organizer: P. W. Geier

Tuesday, 29 August

Room K

Chairman: K. G. Swenson

0915 Opening by Chairman

0930 Geier, P. W. Introduction: On the nature of pest control.

0950 Huffaker, C. B. and Rationale, guidelines and scope.
Smith, R. F.

1030 Tea break

1100 Adkisson, P. L. The cotton system.

1140 Stark, R. W. Principles, strategies and tactics of pest population regulation and control in pine bark beetles ecosystems.

1220 Discussion

1230 Conclusion by Chairman

**SYMPOSIUM 17. INTEGRATED CONTROL — WHAT?
WHY? HOW? WHEN?**

Organizer: P. W. Geier

Monday, 28 August

Room K

Chairman: Josephine Springett

0915 Opening by Chairman

0930 **Way, M. J.** Objectives, methods and scope of integrated control.

1005 **Corbet, P. S.** Application, feasibility and prospects of integrated control.

1040 Tea break

1110 **Wildbolz, Th. and
Meier, W.** A critical assessment of case histories of integrated control in affluent economies.

1145 **Wood, B. J.** Integrated control: a critical review of case histories in developing countries.

1220 Discussion

1230 Conclusion by Chairman

SYMPOSIUM 18. INSECTICIDES AND THE ENVIRONMENT

Organizer: D. F. Waterhouse

Tuesday, 29 August

Room H

Chairman: K. Mellanby

- | | | |
|------|---|---|
| 0915 | Metcalf, R. L. | The attributes of insecticides now and for the future. |
| 0945 | Discussion | |
| 0955 | Reynolds, H. T. | Ecological problems and perspectives in the use of insecticides. |
| 1025 | Discussion
Leader: O. Starnes | Insecticides and the environment in developing countries. |
| 1045 | Tea break | |
| 1115 | Goulding, R. | Sources and health significance of pesticide residue in human tissues. |
| 1145 | Discussion | |
| 1155 | Moore, N. W. | Pest control and conservation; a comparison between conservation research on birds and insects. |
| 1225 | Discussion and Chairman's summary | |

**SYMPOSIUM 19. AN ASSESSMENT OF THE CURRENT
STATUS AND PROSPECTS FOR THE
CONTROL OF ARTHROPODS OF
MEDICAL AND VETERINARY
IMPORTANCE**

Organizer: R. H. Wharton

Tuesday, 29 August

Room F

Chairman: R. Pal

0915	Pal, R.	Introduction
0920	Keiding, J.	House-flies (<i>Musca domestica</i>).
0945	Hansens, E. J.	Discussion
1005	Wharton, R. H.	Ticks, with special emphasis on <i>Boophilus microplus</i> .
1025	Drummond, R. O.	Discussion
1045	Tea break	
1115	Le Berre, R.	The fight against <i>Simulium damnosum</i> : Present state, perspectives for the future.
1140	Lewis, D. J.	Discussion
1200	McClelland, G. A. H.	Control of <i>Stegomyia</i> : achievements and prospects.
1225	Brown, A. W. A.	Discussion

SYMPOSIUM 20.

AGRICULTURAL ENTOMOLOGY IN
DEVELOPING COUNTRIES

Organizer: G. Pasfield

Friday, 25 August

Room F

Chairman:

- 0915

Nickel, J. L.

Pest situation in changing agricultural systems — a review.
- 1000

Ajibola-Taylor, T.
- 1045

Tea break
- 1115

Way, M. J.

Entomological research objectives and strategies in developing countries.
- 1200

Discussion

SYMPOSIUM 21.

ENTOMOLOGY OF MAJOR CHANGES IN LAND USE

Organizer: T. V. Bourke

Monday, 28 August

Room H

Chairman: J. L. Gressitt

- | | | |
|------|---------------------|---|
| 0915 | Gressitt, J. L. | Introduction |
| 0925 | Ford, J. | Entomology of major changes in usage of tropical African savannah with special reference to tsetse flies (<i>Glossina</i> , Diptera: Glossinidae). |
| 0950 | Wallace, M. M. H. | The entomology of major changes in usage of mediterranean type savannah and grassland country. |
| 1015 | Balogh, J. | Effect of major changes in land usage on soil and leaf litter insects and microarthropods. |
| 1040 | Tea break | |
| 1110 | Paterson, H. | Changing patterns in human disease problems resulting from major changes in land usage. |
| 1135 | Discussion | |
| 1230 | Summary by Chairman | |

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY:
METHODOLOGY AND USE OF
COMPUTERS

Organizer: E. B. Britton

Wednesday, 23 August

Room C

Chairman: W. W. Moss

- 1400

Krombein, K. V.

Computerization of the synoptic catalog of North American Hymenoptera.
- 1420

Arnett, R. H.

Entomological information storage and retrieval, particularly for systematic entomology.
- 1440

Britton, E. B.

The use of computer-generated keys.
- 1500

Wilkinson, C.

Some uses of computers in taxonomic entomology.
- 1520

Tea break
- 1550

Corseuil, E.

Estudo dos diaspidideos Brasileiros através de computador.
- 1610

Cancela da
Fonseca, J. F.

L'importance des données manquantes en taxonomie.
- 1630

Giles, E. T.

The relationships of the Hemimerina (Dermaptera).
- 1650

Sakai, S.

A quantitative approach to the problems of the distribution of Dermaptera.
- 1710

Sabrosky, C. W.

Entomology and today's problems in zoological nomenclature.

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY: ZOOGEOGRAPHY

Organizer: E. B. Britton

Thursday, 24 August

Room B

Chairman: R. W. Taylor

- 1400 Lindroth, C. H. The Surtsey investigation, Iceland. The colonisation of a new island.
- 1420 Gressitt, J. L. The evolution of cerambycid beetles in the Hawaiian Islands.
- 1440 Schmidt, G. E. W. The spider fauna of Gran Canaria and its relations with the faunas of other Atlantic islands, Europe, Asia and Africa.
- 1500 Brown, Jr., W. L. The geographical distribution of ants, past and present.
- 1520 Tea break

Chairman: J. L. Gressitt

- 1550 Taylor, R. W. The biogeography of ants in north Queensland rain forests.
- 1610 Stibick, J. N. L. The evolution and biogeography of the economic cacao weevils *Pantorhytes*, Division A.
- 1630 Guiglia, D. ♀ Italy The geographical distribution of the genus *Guiglia* (Hymenoptera).
- 1650 Varley, M. A survey of the distribution of two species of the fruitfly *Drosophila* and two of its hymenopterous parasites in the United Kingdom.
- 1710 Sarà, M. and Salamanna, G. New data on the zoogeography of Psychodidae.(Diptera).

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY: ZOOGEOGRAPHY

Organizer: E. B. Britton

Friday, 25 August

Room B

Chairman: J. J. H. Szent-Ivany

- 1400 Gressitt, J. L. The zoogeographical positions of New Guinea and New Caledonia.
- 1420 Howden, H. F. Zoogeographic relations of Geotrupinae (Coleoptera: Scarabaeidae) occurring in the Southern Hemisphere.
- 1440 Kuschel, G. The biogeographical elements of New Zealand.
- 1500 Bytinski-Salz, H. On the "Genius Loci".
- 1520 Tea break

Chairman: C. H. Lindroth

- 1550 Glumac, S. ^{Yugoslav} Zoogeographic regularities in insect distribution in the Balkan Peninsula. ^{Syrphidae}
- 1610 Kosztarab, M. ^{ke} and Howell, J. The phylogeny and zoogeography of pit scales of the genus *Lecanodiaspis*.
- 1630 Strumpel, H. ^{Melanogaster} The phylogeny and zoogeography of the family Membracidae (Homoptera).
- 1650 Lamb, K. P. New Guinea aphids and their affinities. ^{Trips}
- 1710 Drew, R. A. I. Zoogeography of fruit flies (Diptera: Tephritidae) from the South Pacific area.

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY: MORPHOLOGY

Organizer: E. B. Britton

Friday, 25 August

Room G

Chairman: R. Wenzel

- | | | |
|------|--|--|
| 1400 | Birket-Smith, J. | A revised interpretation of the abdominal morphology of insects based on recent examinations of musculature and innervation. |
| 1420 | Viggiani, G. | The structure and significance of the male genitalia in the Mymaridae (Hymenoptera: Chalcidoidea). |
| 1440 | Barlet, J. | Remarques sur la musculature thoracique d' <i>Oncojapyx</i> (Apterygotes: Diploures). |
| 1500 | Richard, G. | Anatomie nerveuse abdominale des blattes, cas de <i>Blabera craniifer</i> . |
| 1520 | Tea break | |
| 1550 | Goel, S. C. | The taxonomic relationships of the Reduviidae (Heteroptera) as indicated by the thoracic skeleton. |
| 1610 | Bhatnagar, S. P. | Morphology and taxonomy of some Rajasthan melolonthid larvae (Coleoptera: Scarabaeidae). |
| 1630 | Eldridge, B. F. and
Schneider, I., et al. | Comparative phenology of two eastern North American culicine mosquitoes. |

SECTION I

TAXONOMY AND ZOOGEOGRAPHY:
GENERAL SESSION

Organizer: E. B. Britton

Monday, 28 August

Room I

Chairman: H. F. Howden

- | | | |
|------|---|--|
| 1400 | Zwick, P. | Notes on African <i>Neoperla</i> (Plecoptera). |
| 1420 | Mockford, E. L. | A classification of the family Amphipso-
cidae (Psocoptera). |
| 1440 | Short, J. R. T. | The taxonomy of the Pimplinae and
Cryptinae (Hymenoptera) with particular
reference to adult, larval and biological
characters. |
| 1500 | Ramalingam, S. | A revision of the genus <i>Armigeres</i>
(Diptera) in Southeast Asia. |
| 1520 | Tea break | |
| 1550 | <u>Edmunds, Jr., G. F.</u> | The origin of the mayfly family Caenidae. |
| 1610 | <u>Radovsky, F. J.</u> | The protonymph in systematics of
Macronyssidae (Acari). |
| 1630 | <u>Watt, J. C.</u> <i>New Zealand</i> | Towards a revised subfamily classification
of Tenebrionidae. |
| 1650 | <u>Adisoemarto, S.</u>
<i>absent</i> | The role of the Museum Zoologicum
Bogoriense as a centre of research in
insect taxonomy. |
| 1710 | <u>Oliver, E. H. A.</u> | Methods evolved for the collection and
study of the Phoridae of New Zealand. |

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY: GENERAL SESSION

Organizer: E. B. Britton

Monday, 28 August

Room B

Chairman: M. S. Ghilarov

- 1400 Pagés, J. The systematic importance of *Heterojapyx* (Diplura).
- 1420 McAlpine, D. K. The Diptera-Acalyptrata of Australia — some problems in origins, evolution and classification.
- 1440 Becker-Migdisova, E. E. The connection between the phylogeny of the Psyllomorpha (Homoptera) and their alimentary adaptation to host plants.
- 1500 Evans, H. E. and Matthews, R. W. Adaptive radiation in the nesting behaviour of Australian sand wasps of the genus *Bembix*.
- 1520 Tea break

Chairman: C. H. Lindroth

- 1550 Kiauta, B. Mechanisms of karyotypic evolution in dragonflies.
- 1610 van der Vecht, J. The origin and evolution of the Stenogastrinae (subsocial Vespoidea of the Oriental and Papuan regions).
- 1630 Downes, J. A. Sugar meal and protein-containing meal in adult Holometabola.
- 1650 Greenslade, P. Isotomidae (Collembola) as opportunists.
- 1710 Greenslade, P. J. M. Habitat and selection.

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY GENERAL SESSION

Organizer: E. B. Britton

Tuesday, 29 August

Room B

Chairman: G. Kuschel

- | | | |
|------|--------------------------------|---|
| 1400 | Ghilarov, M. S. | Ecological and ethological characters in insect taxonomy and phylogeny. |
| 1420 | Lange, W. H. | Biosystematics of North American aquatic Lepidoptera (Pyralidae: Nymphulinae). |
| 1440 | Amsel, H. G. | Die bedeutung des "Microlepidoptera Palaearctica" fur die Forschung in den Nichtpalaarktischen Gebieten der Erde. |
| 1500 | Wheeler, M. R. and Bock, I. R. | The <i>Drosophila melanogaster</i> group in Southeast Asia. |
| 1520 | Tea break | |
| 1550 | Vilbaste, J. | On some evolutionary trends in Cicadinea Nymphs. |
| 1610 | Lindt, I. I. | Natural selection and the formation of Mantodea species in central Asia. |
| 1630 | Bonnet, P. | Concerning the number of new animal species that are described every year. |
| 1650 | Pichon, G. | The <i>Simulium buissoni</i> complex of the Marquesas Islands: a suspected example of present-day evolution. |
| 1710 | Franciscolo, M. E. | Present status of knowledge of Australian Mordellidae. |

SECTION 1

TAXONOMY AND ZOOGEOGRAPHY: GENERAL SESSION

Organizer: E. B. Britton

Tuesday, 29 August

Room C

Chairman: G. Gross

- | | | |
|------|--|---|
| 1400 | Ueshima, N. | Cytotaxonomy of the Lygaeidae (Heteroptera). |
| 1420 | Russel, L. | The classification of the Aleyrodidae (Homoptera). |
| 1440 | d'Ascoli, A. | The genera of the Venezuelan armored scale insects. |
| 1500 | Eyles, A. C. and
Carvalho, J. C. M. | Studies of New Zealand Miridae. |
| 1520 | Tea break | |
| 1550 | Wood, S. L. | Geologically recent and modern introductions of Scolytidae (Coleoptera) to North America. |
| 1610 | Burks, B. D. | The North American species of Chalcidoidea (Hymenoptera) described by A. A. Girault. |
| 1630 | McAlpine, J. F. | A fossil ironomyiid fly from Canadian amber. |
| 1650 | Levanidova, I. M. | Trichoptera fauna of the Kamchatka Peninsular. |
| 1710 | Beardsley, J. W. | Systematics of the Australian coccid genera <i>Lachnodius</i> and <i>Sphaerococcopsis</i> . |

SECTION 2

GENETICS:
GENERAL SESSION

Organizer: M. J. Whitten

Wednesday, 23 August

Room L

Chairman: K. S. Rai

1400	King, R. C.	Insect gametogenesis.
1420	Bhalla, S. C.	Cytogenetics of 13 sex-linked crossover suppressors and seven translocations in the mosquito <i>Aedes aegypti</i> .
1440	Martin, J., Wuelker, W. W. and Sublette, J. E.	Cytoevolution in the genus <i>Chironomus</i> (Diptera).
1500	Cochran, D. G.	Linkage-group chromosome correlations in the German cockroach.
1520	Tea break	
1550	Stephen, W. P.	Esterase variation in the parthenogenetic populations of the cockroach <i>Pycnoscelus</i> .
1610	Lee, G. L. G.	Sex and caste dimorphism of a quantitative character in the honeybee.
1630	Murray, N. D.	Hybrid zones, natural selection and gene flow in <i>Calomela bantoni</i> (Coleoptera).
1650	Bishop, J. A.	Distribution of melanics in three species of polymorphic moth near Liverpool, U.K.
1710	Saini, R. S.	Relationship of egg size to the rate of nymphal growth and sex ratio in the large milkweed bug.

SECTION 2
(Jointly with
Section 4)

GENETICS:
THE GENETICS OF INSECT
BEHAVIOUR

Organizer: M. J. Whitten

Friday, 25 August

Room L

Chairman: P. A. Parsons

- | | | |
|------|--|---|
| 1400 | Ehrman, L. | A factor influencing the rare-male mating advantage. |
| 1440 | McKenzie, J. A. | Sexual selection and isolation in <i>Drosophila</i> . |
| 1500 | Crossley, S. | Some gene effects on behaviour in <i>Drosophila melanogaster</i> . |
| 1520 | Tea break | |
| 1550 | MacBean, I. T. | Genetic analysis of duration of copulation in <i>Drosophila melanogaster</i> . |
| 1610 | Averhoff, W. W. and
Richardson, R. H. | The genetics of negative assortative mating and courtship stimuli in <i>Drosophila melanogaster</i> . |
| 1630 | Hay, D. A. | The ability of <i>Drosophila melanogaster</i> to recognise different genotypes |
| 1650 | Parsons, P. A. | Male mating speed as a component of fitness in <i>Drosophila</i> . |
| 1710 | Parsons, P. A. | General conclusions. |

SECTION 2

GENETICS:
APPLICATION OF GENETICS IN
INSECT CONTROL

Organizer: M. J. Whitten

Monday, 28 August

Room D

Chairman: R. Pal

- | | | |
|------|-------------------------------|---|
| 1400 | Laven, H. | Use of cytoplasmic incompatibility and chromosome rearrangements for insect control. |
| 1420 | Barr, A. R. and Yen, J. | Incompatibility in <i>Culex pipiens</i> . |
| 1440 | Baker, R. H. and Sakai, R. K. | Genetic studies on <i>Culex tritaeniorhynchus</i> . |
| 1500 | Discussion | |
| 1520 | Tea break | |
| 1550 | Rai, K. S. | Studies on genetic control of the mosquito <i>Aedes aegypti</i> . |
| 1610 | Sakai, R. K. | Sterility enhancement in the mosquito <i>Culex tritaeniorhynchus</i> . |
| 1630 | Wagoner, D. E. | The present status of genetic control mechanisms in the house fly, <i>Musca domestica</i> . |
| 1650 | Hogan, T. W. | A genetic approach to the population suppression of <i>Teleogryllus commodus</i> . |
| 1710 | Pal, R. | Summary and discussion. |

SECTION 3

PHYSIOLOGY AND FINE STRUCTURE OF INSECTS: THE STRUCTURE OF THE INTEGUMENT

Organizer: A. C. S. Crossley

Wednesday, 23 August

Room J

Chairman: A. C. S. Crossley

- | | | |
|------|---------------------------------------|--|
| 1400 | Beaton, C. D. and
Filshie, B. K. | Methods for the examination of insects
in the scanning E.M. |
| 1420 | Lefeuvre, J. C. | Apport de la microscopie électronique a
balayage (scanning) dans la compréhension
du polymorphisme alaire. |
| 1440 | Helson, G. A. H. and
Flower, N. E. | An SEM study of the antennae of pest
species of New Zealand moths (Lepidop-
tera). |
| 1500 | Sturckow, B. and
Holbert, P. E. | Fine structure of the tip of the labellar
taste hair of blow flies. |
| 1520 | Tea break | |
| 1550 | Hinton, H. | Physiological colour changes in the elytra
of beetles. |
| 1610 | Veron, J. E. N. | The chromatophores of some Australian
Odonata. |
| 1630 | Filshie, B. K. and
Beaton, C. D. | The cuticular fine structure of some
Diptera exhibiting physical colouration. |
| 1650 | Smithwick, E. B.
and Brady, U. E. | Sex pheromone gland production in
female Indian Meal moths. |
| 1710 | Dabrowski, J. E. | Altering wing pattern in Lepidoptera
by injection of chemicals. |

SECTION 3

PHYSIOLOGY AND FINE
STRUCTURE OF INSECTS:
WATER RELATIONS IN INSECTS

Organizer: A. C. S. Crossley

Thursday, 24 August

Room J

Chairman:

- | | | |
|------|--------------------------------|--|
| 1400 | Verrett, J. McK. | Water balance in the American cockroach. |
| 1420 | Abushama, F. T. E. | Water reaction in single and groups of workers of the termites, <i>Macrotermes bellicosus</i> and <i>Trinevitermes geminatus</i> . |
| 1440 | Bains, S. S. and Atwal, A. S. | Role of temperature and water balance in the termination of larval diapause in <i>Bissetia steniellus</i> (Lepid: Crambidae). |
| 1500 | Tonapi, G. T. | Thermo-regulatory role of insect tracheal system. |
| 1520 | Tea break | |
| 1550 | Leader, J. P. | Osmoregulation of the marine larva of <i>Philinissus plebeius</i> . |
| 1610 | Marshall, A. T. and Wright, A. | Membrane dynamics and ion transport in the hindgut cells of <i>Ephydrella breviseta</i> larvae (Diptera). |
| 1630 | Marshall, A. T. and Wright, A. | Scanning electron microscopy of some ion and water transporting tissues. |

SECTION 3

PHYSIOLOGY AND FINE STRUCTURE OF INSECTS: GROWTH

Organizer: A. C. S. Crossley

Friday, 25 August

Room J

Chairman: B. Johnson

- | | | |
|------|---|---|
| 1400 | Raabe, M., Baudry, N., Grillot, J. P. and Provansal, A. | The perisymphathetic organs of insects. |
| 1420 | Beattie, T. M. | Fine structure of the vascular system supplying the antennae of <i>Periplaneta americana</i> . |
| 1440 | Kim, C. W. | Ultrastructural changes of the corpora allata in the pine moth, <i>Dendrolimus spectabilis</i> , during the metamorphosis. |
| 1500 | Edwards, J. S. and Palka, J. | Specificity in the regenerating cercal nerves of the house cricket <i>Acheta domesticus</i> . |
| 1520 | Tea break | |
| 1550 | Hamilton, A. G. | Determination of respiratory quotient of insects using twin channel null-balance paramagnetic O ₂ and infra-red CO ₂ analysers. |
| 1610 | Jones, J. C. and Pilitt, D. R. | Effects of ether vapor, hypoxia, trypan-blue injections, and removal of the abdominal nerve cord on the heartbeat of intact male <i>Periplaneta americana</i> adults. |
| 1630 | Nappi, A. J. | Melanization in the immune reaction of <i>Drosophila algonquin</i> against the hymenopterous parasite <i>Pseudeucoila bochei</i> . |
| 1650 | Clements, A. N. | Aspects of locust neuromuscular physiology. |

SECTION 3

PHYSIOLOGY AND FINE STRUCTURE OF INSECTS: DIAPAUSE AND PARTHENOGENESIS

Organizer: A. C. S. Crossley

Monday, 28 August

Room L

Chairman: A. F. O'Farrell

- | | | |
|------|--|---|
| 1550 | Ushatinskaya, R. S. | Ecological and physiological features of perennial diapause of the Colorado potato beetle. |
| 1610 | Visscher, S. N. | Analysis of embryonic diapause in <i>Aulocara ellioti</i> (Orthoptera: Acrididae): histological, quantitative and experimental. |
| 1630 | Hasegawa, K., Goto, T. and Isobe, M. | The diapause hormone of the silk worm — its purification and assay. |
| 1650 | Bawa, S. R., Kanwar, K. C. and Bansal, M. R. | Biochemical characteristics of fertile and sterile strains of <i>Callosobruchus maculatus</i> . |
| 1710 | Lowe, A. D. | Parthenogenesis in some New Zealand aphids. |

SECTION 3

PHYSIOLOGY AND FINE STRUCTURE OF INSECTS: INSECT SECRETIONS

Organizer: A. C. S. Crossley

Tuesday, 29 August

Room J

Chairman: B. Fletcher

- | | | |
|------|-------------------------------------|---|
| 1400 | Esmaili, M. | Wax secretion in bees of genera <i>Anthophora</i> and <i>Emphorapsis</i> . |
| 1420 | Marshall, A. T.
and Lewis, C. T. | The cuticle and cuticular secretions of an epipyropid larva <i>Epipyrops anomala</i> . |
| 1440 | Stay, B. and
Coop, A. | The nutrition of a viviparous cockroach embryo: its source and method of uptake. |
| 1500 | May, I. R. | Aspects of physiological changes governing the swarming of locusts. |
| 1520 | Tea break | |
| 1550 | Baccetti, B. | Structure and motility in insect spermatozoa. |
| 1610 | Happ, G. M. and
Gadzama, N. M. | Sperm transfer and storage in <i>Tenebrio molitor</i> . |
| 1630 | De Toledo-Piza, S. | Some interesting peculiarities in the spermatogenesis of the lampyrid beetle <i>Aspisoma hesperum</i> . |
| 1650 | Choudhuri, D. K. | On the characterisation of the stink components of heteropteran bugs. |

SECTION 4
(Jointly with
Section 3)

BEHAVIOUR:
COMPOUND EYE, PART I

Organizer: G. A. Horridge

Wednesday, 23 August

Room K

Chairman: B. Walcott

1400	Horridge, G. A.	Superposition and clear zone eyes.
1420	Carricaburu, P.	Dioptics of compound eyes with crystal-line threads.
1440	Snyder, A. W.	Electromagnetic properties of visual receptors of the compound eye.
1500	Eguchi, E. and Waterman, T. H.	Comparative studies on rhabdom fine structures of arthropod compound eyes.
1520	Tea break	
1550	Meinertzhagen, I. A.	The growth of the first visual projection of <i>Calliphora</i> .
1610	Meyer-Rochow, V. B.	Structure and function of eyes of nocturnal scarabaeid beetles.
1630	White, R. H.	Visual pigments of the larval mosquito <i>Aedes aegypti</i> .
1650	Mazokhin-Porshnyakov, G. A.	Investigation of visual properties in ants.
1710	Wulff, V. J.	On the origin and modification of the receptor potential of the lateral eye of <i>Limulus</i> .

SECTION 4
(Jointly with
Section 6)

BEHAVIOUR:
MIGRATION AND DISPERSAL (I)

Organizer: L. B. Barton Browne

Wednesday, 23 August

Room CS

Chairman: J. L. Gressitt

- | | | |
|------|---|---|
| 1400 | Baker, R. R. <i>England</i> | Evolution of migration and dispersal patterns. |
| 1440 | Kitching, R. L. | The components of insect movement — an approach to simulation. |
| 1520 | Tea break | |
| 1550 | Wolfenbarger, D. O.,
Cornell, J. A. and
Wolfenbarger, D. A. | Mean dispersal distances attained by insect populations of different densities. |
| 1630 | Waloff, N. | Dispersal by flight of some grassland leafhoppers. |
| 1650 | Richards, A. M. | The migration of cave arthropods across the Nullabor Plain. |

SECTION 4

BEHAVIOUR:
GENERAL SESSION

Organizer: L. B. Barton Browne

Thursday, 24 August

Room L

Chairman: S. W. Bailey

- | | | |
|------|---------------------|--|
| 1400 | Le Masne, G. | The evolution of social behaviour in ants. |
| 1420 | Klostermeyer, E. C. | Relation of provision weights to sex of progeny of <i>Megachile rotundata</i> (Hymenoptera). |
| 1440 | Móczár, L. | Foreign nest visiting of <i>Paragymnomerus spiricornis</i> Spinola (Hymenoptera). |
| 1500 | Davis, T. A. | Pattern of nest building in two social wasps. |
| 1520 | Tea break | |
| 1550 | Hemmingsen, A. M. | Oviposition behaviour in Vermileoninae (Diptera). |
| 1610 | Peters, W. L. | The adult habits of <i>Dolania americana</i> (Ephemeroptera). |
| 1630 | Okui, K. | Aggregative behaviour in silkworms. |
| 1650 | Wiendl, F. M. | Radioperceptibility of adults of <i>Sitophilus zeamais</i> . |

SECTION 4
(Jointly with
Section 3)

BEHAVIOUR:
COMPOUND EYE, PART II

Organizer: G. A. Horridge

Thursday, 24 April

Room K

Chairman: G. A. Horridge

- | | | |
|------|---|---|
| 1400 | Laughlin, S. | The integrative properties of second-order visual units on the dragonfly. |
| 1420 | Walcott, B. | Cell movement on light/dark adaptation in compound eyes. |
| 1440 | Miller, W. H. | Physiological effect of cyclic AMP in <i>Limulus</i> photoreceptor. |
| 1500 | Menzel, R. | Evidence for colour receptors in the hymenopteran eye obtained from selective adaptation experiments. |
| 1520 | Tea break | |
| 1550 | Goodman, L. J. | The role of the dorsal ocellus in insect vision. |
| 1610 | Kaiser, W. | Optomotor response studies with spectral lights — behavioural evaluation and single unit recording in honey bees. |
| 1610 | Kien, J. | Optokinetic responses in locust. |
| 1650 | Northrop, R. B. | Form-discrimination and spatial acuity in insect vision. |
| 1710 | Taddei Ferretti, C.
and Fernandez Perez
de Talens, A. | Monocular and binocular vision in the landing reaction of <i>Musca domestica</i> . |

SECTION 4

(Jointly with

Section 6)

BEHAVIOUR:

MIGRATION AND DISPERSAL (II)

Organizer: L. B. Barton Browne

Thursday, 24 August

Room CS

Chairman: T. O. Browning.

1400	Dingle, H.	Physiological and ecological integration of flight and reproduction in migrant insects.
1440	Caldwell, R. L.	An experimental analysis of the strategies of dispersal behaviour in two milkweed bugs, <i>Oncopeltus fasciatus</i> and <i>Lygaeus kalmii</i> (Lygaeidae).
1500	Rankin, M. A.	An experimental analysis of the physiological control of flight and reproduction in <i>Oncopeltus fasciatus</i> (Lygaeidae).
1520	Tea break	
1550	Stengel, M. M. C.	Analysis of the physiological bases of the migration behaviour of <i>Melolontha melolontha</i> (Scarabaeidae).
1610	Roffey, J.	Migration and dispersal in the Australian plague locust.
1650	Hughes, R. D. & Nicholas, W. L.	The effect of different patterns of dispersal of the bushfly on the distribution and abundance of its nematode parasite.

SECTION 4
(Jointly with
Section 3)

BEHAVIOUR:
COMPOUND EYE, PART III

Organizer: G. A. Horridge

Friday, 25 August

Room K

Chairman: V. G. Dethier

- | | | |
|------|---|---|
| 1400 | Götz, K. G. | Visual navigation in <i>Drosophila</i> . |
| 1420 | Taddei Ferretti, C.
and Fernandez Perez
de Talens, A. | Luminous characteristics of the stimuli
eliciting landing reaction in <i>Musca
domestica</i> . |

EXPERIMENTAL ANALYSIS OF
INSECT BEHAVIOUR, PART I

Organiser: L. B. Barton Browne

- | | | |
|------|--------------------------------------|---|
| 1440 | Chapman, R. F.,
and Bernays, E.A. | The regulation of food intake by
acridids. |
| 1500 | Stoffolano, J. G. | Central control of feeding in diapausing
adult <i>Phormia regina</i> (Calliphoridae). |
| 1520 | Tea break | |
| 1550 | Belton, P. | An analysis of direction finding in male
mosquitos. |
| 1610 | Koltermann, R. | Time linked process of learning and for-
getting in honeybees. |
| 1630 | Menzel, R. | Time-dependence of learning performance
in the honey-bee. |
| 1650 | Maldonado, H. | Learning in praying mantis — a behavioural
and biochemical approach. |
| 1710 | Barros-Pita, J. C. | Correlation of amount of visual informa-
tion, inter-trial interval and habituation
time of deimatic response in mantids. |

SECTION 4

BEHAVIOUR:
EXMPERIMENTAL ANALYSIS OF
INSECT BEHAVIOUR

Organizer: L. B. Barton Browne

Monday, 28 August

Room K

Chairman: C. H. Fraser Rowell

1400	Sutherland, O. R. W. and Hutchins, R. F. N.	The attraction of newly-hatched codling moth (<i>Laspeyresia pomonella</i>) larvae to the apple hydrocarbon a-farnesene.
1420	Saxena, K. N.	Control and simulation of host selection of certain phytophagous insects.
1440	Hsiao, T. H.	Chemical regulation of feeding behaviour in <i>Leptinotarsa</i> beetles.
1500	Moran, V. C.	Host plant location and selection by the citrus psylla <i>Trioza erytreae</i> .
1520	Tea break	
1550	Milburn, N. S.	Some aspects of cercal sensory input to giant axons in cockroaches.
1610	Hoyle, G. and Burrows, M.	Integration by identified neurons involved in locust behaviour.
1630	Gewecke, M.	The antennae of insects as air current sense organs and their significance for flight control.
1650	Elsner, N.	The neuronal basis of sound production in grasshoppers.
1710	Elsner, N.	

CONGRESS AREA



KEY TO SITE MAP

- 1 University information
- 2 University House
- 3 Lennox House
(University Pre-School and Child Care Centre)
- 4 University Staff Centre
- 5 Vice-Chancellor's House
- 6 Old Hospital Buildings
- 7 Research School of Physical Sciences
- 8 Research School of Biological Sciences
- 9 John Curtin School of Medical Research
- 10 Central Store
- 11 Burgmann College
- 12 John XXIII College
- 13 Ursula College
- 14 Forestry Building "P,Q"
- 15 Botany Department Experimental Area
- 16 Botany Building
- 17 Garran Hall
- 18 Burton Hall
- 19 Zoology Building
- 20 Psychology Building
- 21 Bruce Hall
- 22 Physics Building "K,L,M,"
- 23 Biochemistry Building
- 24 Research School of Chemistry "J"
- 25 Chemistry Building "H,I"
- 26 Geology Building "G,R"
- 27 Haydon-Allen Building "F,S-Z"
- 28 Copland Building "A,B,C,D,E"
- 29 Childers Street Buildings
- 30 University Union
- 31 Melville Hall
- 32 University Library -J.B.Chifley Building
- 33 Maintenance Depot and Boiler House
- 34 Research School of Biological Sciences
- 35 Chancelry
- 36 Asian Studies Building
- 37 Law School "O"
- 38 Old Administration Buildings
(including Post Office, Banking Centre,
Canteen and Credit Union)
- 39 H.C.Coombs Building "N"
- 40 University Library-R.G.Menzies Building
- 41 University Telephone Exchange
- 42 Division of Entomology CSIRO
- 43 Division of Plant Industry CSIRO "CS"
- 44 Division of Land Research CSIRO

SECTION 4

BEHAVIOUR:
EXPERIMENTAL ANALYSIS OF
INSECT BEHAVIOUR

Organizer: L. B. Barton Browne

Tuesday, 29 August

Room K

Chairman: C. M. Williams

1400	Riddiford, L. M.	The role of hormones in the reproductive behaviour of wild silkmoths.
1420	Truman, J. W.	The eclosion hormone: its dual role as a releaser and as a primer of insect behaviour.
1440	Richard, G., Grillou, H., et Vancassel, M.	Régulation des comportements reproducteurs des femelles d'insectes — cas particuliers de <i>Blabera craniifer</i> , et <i>Labidura riparia</i> .
1500	Pener, M. P.	Neurosecretory and corpus allatum mediated effects on male sexual behaviour in acridids.
1520	Tea break	
1550	Kutsch, W.	The development of the flight pattern in locusts.
1610	Tyrer, N. M. and Altman, J. S.	Development of functional connections in the neurones controlling flight in locusts.
1630	Young, D.	Specificity and regeneration in cockroach motoneurons.
1650	Edwards, J. S. and Palka, J.	Specificity in the regenerating cercal nerves of the house cricket, <i>Acheta domesticus</i> .
1710	Howse, P. E.	A theory of insect brain function.

SECTION 4

BEHAVIOUR: GENERAL SESSION

Organizer: L. B. Barton Browne

Tuesday, 29 August

Room L

Chairman: K. N. Saxena

- | | | |
|------|------------------------------------|--|
| 1400 | Madden, J. L. and Simpson, R. F. | The response of the woodwasp <i>Sirex noctilio</i> to host tree volatiles. |
| 1420 | Strübing, H. | Sound production in some European planthoppers (<i>Euscelis</i> spp.). |
| 1440 | Young, D. | Mechanism of sound production in Australian cicadas. |
| 1500 | Joseph, K. J. | The male calling song of the big brown cricket (<i>Brachytrypes portentosus</i>) and the structure of its stridulatory apparatus. |
| 1520 | Drew, R. A. I. | The attraction of fruit flies (Tephritidae) to chemical lures. |
| 1550 | Tea break | |
| 1610 | van Lenteren, J. C. and Bakker, K. | Results of an interdisciplinary study on host discrimination in <i>Pseudeucoila bochei</i> (Cynipidae): behavioural, morphological and ecological aspects. |
| 1630 | Toye, S. A. | On the feeding and locomotory activities of <i>Zonocerus variegatus</i> (Acridoidea). |
| 1650 | Ascher, K. R. S. and Meisner, J. | A re-valuation of the "Styroper method" for assessing phagostimulation in the larvae of some phytophagous insects. |
| 1710 | Wardhaugh, K. G. | An experimental analysis of the influence of photoperiod and temperature on the oviposition behaviour of <i>Chortoicetes terminifera</i> . |

SECTION 5

BIOCHEMISTRY:
THE BIOPHYSICS AND
BIOCHEMISTRY OF INSECT FLIGHT

Organizer: D. Gilmour

Wednesday, 23 August

Room M

Chairman: M. Rockstein

- 1400

Hoyle, G.

Generation of flight motor activity.
- 1430

Burrows, M.

Neuronal circuits in the flight system of the locust.
- 1500

Bastian, J.

Electrical activity in asynchronous muscles and flight control.
- 1530

Tea break

Chairman: D. Gilmour

- 1550

Rockstein, M.

The utilization of carbohydrates by insects during flight.
- 1630

Ashurst, D. E.

Some aspects of the structure of fibrillar muscles.
- 1700

dos Remedios, C.

Is there cross-bridge synchrony in oscillating flight muscle?

SECTION 5
(Joint Programme
with Section 3)

BIOCHEMISTRY:
REGULATION OF INSECT
DEVELOPMENT

Organizer: D. Gilmour

Thursday, 24 August

Room H

Chairman: R. R. Mills

- | | | |
|------|--------------------------------|---|
| 1400 | Engelmann, F. | Endocrine regulation of specific protein synthesis. |
| 1420 | Feir D. and
Dev Bassi, S. | Action of juvenile hormone in a hemimetabolous insect. |
| 1440 | Paul, M. and
Kafatos, F. C. | Development of the follicular cells and chorion protein synthesis in saturniid moths. |
| 1500 | Clift, A. D. | A new protein-dependent neurosecretory product involved in oogenesis in <i>Lucilia cuprina</i> (Diptera). |
| 1520 | Tea break | |

Chairman: B. Scharrer

- | | | |
|------|------------------|--|
| 1550 | Riddiford, L. M. | Juvenile hormone and insect embryonic development. |
| 1610 | Staal, G. B. | The influence of externally applied JH analogs on insect development. |
| 1630 | Novák, V. J. A. | Juvenoids, their way of action and their theoretical and practical importance. |

SECTION 5
(Joint Programme
with Section 3)

BIOCHEMISTRY:
REGULATION OF INSECT
DEVELOPMENT

Organizer: D. Gilmour

Friday, 25 August

Room H

Chairman: A. F. O'Farrell

- | | | |
|------|---|---|
| 1400 | Burdette, W. J. | Hormonal heterophylly. |
| 1420 | Emmerich, H. | Ecdysone-binding proteins in nuclei and chromatin from <i>Drosophila</i> salivary glands. |
| 1440 | Horn, D. H. S.,
Galbraith, M. N. and
Middleton, E. J. | The chemistry and biosynthesis of insect moulting hormones. |
| 1500 | Hsiao, T. H. and
Hsiao, C. | Behavioural control of ecdysone release during pupation of the Colorado potato beetle. |
| 1520 | Tea break | |

Chairman: A. J. Howells

- | | | |
|------|--|--|
| 1550 | Nishiitsutsuji-Uwo, J. | Isolation and properties of insect brain hormone. |
| 1610 | Gersch, M. | New results on the mode of action of the brain neurohormone on insect development. |
| 1630 | Mills, R. R. | Sclerotization of the cockroach cuticle. |
| 1650 | Ohnishi, E., Yama-
zaki, H. I., Dohke, K.
and Ashida, M. | Phenoloxidase systems. |

SECTION 5
(Joint Programme
with Section 3)

BIOCHEMISTRY:
REGULATION OF INSECT
DEVELOPMENT

Organizer: D. Gilmour

Monday, 28 August

Room H

Chairman: L. M. Birt

- | | | |
|------|--------------------------------|--|
| 1400 | Thomson, J. A. | Contrasting patterns of gene activity in insect development. |
| 1420 | Levenbook, L. and Bauer, A. C. | Some aspects of protein metabolism during metamorphosis of the fly <i>Phormia regina</i> . |
| 1440 | Laufer, H. | Hormonal control of chromosome puffing. |
| 1500 | Lawrence, P. A. | |
| 1520 | Tea break | |

Chairman: A. R. Gilby

- | | | |
|------|-----------------------------------|---|
| 1550 | Painter, R. R. and Kilgore, W. W. | Characteristics of proteins and nucleic acids during oogenesis and embryogenesis of <i>Musca domestica</i> . |
| 1610 | Davey, R. A. and Howells, A. J. | Changes in transfer RNA patterns during the development of <i>Drosophila melanogaster</i> . |
| 1630 | Williams, K. L. | Studies of the synthesis of mitochondrial proteins in <i>Lucilia</i> (Diptera). |
| 1650 | Campbell, A. J. | Soluble protein synthesis during the adult development of <i>Lucilia</i> (Diptera). |
| 1710 | Austin, R. L. and Howells, A. J. | The ommochrome biosynthetic pathway of <i>Drosophila melanogaster</i> : variations in the levels of enzymes and intermediates during development. |

SECTION 5
(Joint Programme
with Section 3)

BIOCHEMISTRY:
BIOCHEMISTRY OF THE CUTICLE

Organizer: D. Gilmour

Monday, 28 August

Room J

Chairman: R. H. Hackman

- | | | |
|------|--|---|
| 1400 | Geiger, J. G. | Synthesis of cuticle proteins during development of the cockroach. |
| 1420 | Stielstra, E. A. | Incorporation of haemolymph proteins into the cuticle of the cockroach. |
| 1440 | Bronskill, J. F. and Bodnaryk, R. P. | γ -Glutamyl transpeptidase activity in the immature housefly <i>Musca domestica</i> : a histochemical study. |
| 1500 | Delachambre, J., Grillot, J. P. and Provansal, A. | Tanning of <i>Tenebrio molitor</i> L. adults: Role of abdominal neurohaemal organs in the release of tanning hormone. |
| 1520 | Tea break | |

Chairman: B. P. Moore

- | | | |
|------|---------------------------------|---|
| 1550 | Lipke, H. and Strout, V. | Chain characters of puparial chitin. |
| 1610 | Koepppe, J. K. | Metabolism of aromatic amines in the cockroach. |
| 1630 | Takahashi, S. | Occurrence of phenols in the ventral glands of the American cockroach, <i>Periplaneta americana</i> . |

SECTION 5
(Joint Programme
with Section 3)

BIOCHEMISTRY:
REGULATION OF INSECT
DEVELOPMENT

Organizer: D. Gilmour

Tuesday, 29 August

Room H

Chairman: M. Rockstein

- 1400 Scharrer, B. Structure-function relationships in the endocrine system.
- 1420 Berry, S. J. RNA synthesis during silkworm oogenesis.
- 1440 Ashurst, D. Synthesis and development of collagenous tissues.
- 1550 White, J. F. Fine structure of the diapause and developing silkworm ovariole sheath.
- 1520 Tea break

Chairman: J. A. L. Watson

- 1550 O'Farrell, A. F. and Stock, A. Regeneration in Adult *Blattella germanica*.
- 1610 Ohtaki, T. Effects of ecdysone on the development of imaginal disks in *Sarcophaga peregrina*.
- 1630 Hasskarl, E., Oberlander, H. and Stephens, R. E. Microtubules and tracheal migration in wing disks cultured *in vitro*.
- 1650 Beck, S. D. Retrogressive development in *Trogoderma glabrum*.
- 1710 Watson, J. A. L. The worker castes of the hodotermitid harvester termites.

SECTION 5

BIOCHEMISTRY: GENERAL SESSION

Organiser: D. Gilmour

Tuesday, 29 August

Room I

Chairman: J. E. O'Hagan

- | | | |
|------|--|--|
| 1400 | Shine, J. and
Dalgarno, L. | The existence of three polynucleotide chains in 26S ribosomal RNA from cultured <i>Aedes aegypti</i> cells. |
| 1420 | Fillippovich, J. B.
and Minina, N. I. | Enzymes in tissues of silkworm during ontogenesis. |
| 1440 | Lee, K. R. | Changes in trehalose concentration and oxygen consumption during the metamorphosis of the rice stem borer, <i>Chilo suppressalis</i> . |
| 1500 | Bieber, L. L. and
Rottman, F. | Utilization of the methyl group of methionine by <i>Musca domestica</i> larvae. |

1520 Tea break

Chairman: R. H. Hackman

- | | | |
|------|---------------------------------|--|
| 1550 | Saxena, S. C. and
Kaul, S. | Effect of folic acid antimetabolite (aminopterin) on the growth and metamorphosis of <i>Oryzaephilus mercator</i> larvae. |
| 1610 | Mehrotra, K. N. | Carbohydrate metabolism in the nervous tissues of the desert locust. |
| 1630 | Saxena, S. C. and
Gohain, R. | Qualitative analysis of free amino acids in the developmental stages of <i>Lasioderma serricorne</i> by thin layer chromatography. |
| 1650 | Standifer, L. N. | Egg production, oviposition, and survival of isolated queen honey bees fed experimental diets. |
| 1710 | Jurzitza, G. | The role of yeastlike endosymbionts of the Anobiidae in the protein metabolism of the host. |

SECTION 6

ECOLOGY: COMMUNITIES

Organizer: T. O. Browning

Wednesday, 23 August

Room N

Chairman: G. C. Varley

- | | | |
|------|--|---|
| 1400 | Muma, M. H. | Comparison of ground surface spiders in four central Florida ecotones. |
| 1420 | Fanara, D. M. | Desert pond communities as influenced by biological and chemical mosquito controls. |
| 1440 | Beaver, R. A. and
Beaver, O | Classification and ordination of communities at different trophic levels. |
| 1500 | Consiglio, C., Argano,
R. and Boitani, L. | Ecological niches in two communities of adult Odonata. |
| 1520 | Tea break | |
| 1550 | May, R. M. | Stability versus complexity in model ecosystems. |
| 1610 | Wood, M. J. | The ecology of <i>Acacia</i> cecidozoa. |
| 1630 | Sleeper, E. L. | A study of insect populations of two different North American desert plant communities and factors influencing density. |
| 1650 | Weir, J. S. | Burial of cow and buffalo dung by large scarabaeid beetles in Rhodesia. |
| 1710 | Markevitch, A. P.
and Jurkina, V. I. | The ecological and geographical peculiarities of the flea fauna of the Ukraine. |

SECTION 6

ECOLOGY:
GENERAL SESSION

Organizer: T. O. Browning

Thursday, 24 August

Room N

Chairman: S. Pradhan

- | | | |
|------|------------------------------------|--|
| 1400 | Machado-Allison,
C. E. et al | Studies on the ecological genetics of natural and laboratory populations of <i>Aedes aegypti</i> . |
| 1420 | Delvi, M. R. and
Pandian, T. J. | Ecological energetics of a population of the grasshopper <i>Poeciloceru pictu</i> s. |
| 1440 | Weir, J. S. | Mechanisms of mineral accumulation in <i>Macrotermes</i> mounds in Africa. |
| 1500 | Tischler, W. | Ecological studies on the arthropod fauna of man-made habitats with special regard to synanthropy. |
| 1520 | Tea break | |

Chairman: H. Heddergott

- | | | |
|------|---|--|
| 1550 | Strazdiene, V. | Specific composition and distribution of wireworms in Lithuanian soils. |
| 1610 | McClelland, G. A. H.
et al | Use of heavy elements for marking insects. |
| 1630 | White, E. G. | Distinguishing subpopulations in a capture-recapture study. |
| 1650 | Pandian, T. J. and
Delvi, M. R. | Bioenergetics of the grasshopper <i>Poeciloceru pictu</i> s. |
| 1710 | Van der Aart, P. J. M.
and de Bruyn, G. J. | Analysis of arthropod distribution by means of principal component analysis. |

SECTION 6

ECOLOGY: POPULATIONS

Organizer: T. O. Browning

Friday, 25 August

Room N

Chairman: H. Klomp

- | | | |
|------|-------------------|---|
| 1400 | Farrow, R. A. | Comparative plague dynamics of tropical <i>Locusta</i> . |
| 1420 | Pradhan, S. | Further studies on the biotic theory of locust cycles. |
| 1440 | Beaver, O. | Intra- and inter-specific competition between sciomyzid larvae (Diptera). |
| 1500 | Heddergott, H. | Contributions to the analysis of the dynamics of populations of <i>Haplodiplosis equestris</i> and its parasites. |
| 1520 | Tea break | |
| 1550 | Eikenbary, R. D. | Population dynamics of greenbugs parasitized by <i>Lysiphlebus testaceipes</i> . |
| 1610 | Varley, G. C. | New methods provide a re-interpretation of Nicholson's blowfly population 'oscillations'. |
| 1630 | Monro, J. | Population stabilizing mechanisms in <i>Cactoblastis cactorum</i> . |
| 1650 | Ettershank, G. | A computer population model to test mark/recapture methods of estimating populations. |
| 1710 | Sonleitner, F. J. | A computer simulation model for the study of population dynamics. |

SECTION 6

ECOLOGY:
THE IDEA OF A POPULATION – ITS
IMPLICATION FOR THEORY AND
PRACTICE

Organizer: T. O. Browning

Monday, 28 August

Room N

Chairman: T. O. Browning

- | | | |
|------|---|--|
| 1400 | Maelzer, D. A. | The frequency distribution of colony size as the basic data in the population dynamics of the rose-aphid, <i>Macrosiphum rosae</i> . |
| 1440 | Hughes, R. D. | A frame of reference for population studies. |
| 1520 | Tea break | |
| 1550 | Bateman, M. A. | Local populations. |
| 1630 | Remarks by K. E. F. Watt and T. R. E. Southwood and general discussion. | |

SECTION 6

ECOLOGY: DISTRIBUTION AND BIONOMICS

Organizer: T. O. Browning

Tuesday, 29 August

Room N

Chairman: W. W. Murdoch

- | | | |
|------|-----------------|---|
| 1400 | Gorham, J. R. | Tundra and taiga mosquitoes in Alaska. |
| 1420 | Cheary, B. S. | The biology, ecology and distribution of the genus <i>Laccobius</i> of the New World. |
| 1440 | Parnell, J. R. | Observations on the bionomics of <i>Asphondylia boerhaaviae</i> in Jamaica. |
| 1500 | Viktorov, G. A. | Interspecific competition and coexistence of ecological homologues in the complex of <i>Eurygaster integriceps</i> egg parasites. |
| 1520 | Tea break | |

Chairman: G. A. Viktorov

- | | | |
|------|-------------------|---|
| 1550 | Forsyth, D. J. | The distribution of two larval phenotypes of <i>Chironomus zealandicus</i> , in two eutrophic lakes in New Zealand. |
| 1610 | Cherepanov, A. I. | Ecological aspects of evolution of fauna of Cerambycidae from Siberia. |
| 1630 | Grigelis, A. I. | Dynamics and production of the larvae of <i>Chironomus bathophilus</i> in the Lake Dusia. |
| 1650 | Haberman, H. | A comparative ecological and zoogeographical analysis of the Estonian fauna of Staphylinidae. |
| 1710 | Baeva, V. G. | Fauna of psyllids and its distribution in relation to vertical zonation. |

SECTION 7

BIOLOGICAL CONTROL: BIOLOGICAL CONTROL OF WEEDS

Organizer: E. McC. Callan

Wednesday, 23 August

Room O

Chairman: F. Wilson

- | | | |
|------|---------------------|---|
| 1400 | Bennett, F. D. | Current status of the biological control of <i>Salvinia</i> in Africa. |
| 1420 | Wapshere, A. J. | The possibility of controlled biological control of weeds. |
| 1430 | van der Meijden, E. | Effects of food and larval density on the fecundity of cinnabar moth and their relevance to control of the foodplant ragwort. |
| 1440 | Harris, P. | The selection of effective agents for biological control of weeds. |
| 1500 | Cullen, J. M. | Effective damage to weed species by natural enemies. |
| 1520 | Tea break | |
| 1550 | New, T. R. | Discussion. |
| 1610 | Clifford, H. T. | Host-parasite relationships. |
| 1630 | Harley, K. L. S. | The determination of host specificity. |
| 1650 | Wapshere, A. J. | Discussion. |

SECTION 7

BIOLOGICAL CONTROL: SPECIFIC BIOLOGICAL CONTROL PROJECTS

Organizer: E. McC. Callan

Thursday, 24 August

Room O

Chairman: R. I. Sailer

- | | | |
|------|--------------------|---|
| 1400 | Cochereau, P. L. | Population dynamics of the fruit-sucking moth <i>Othreis fullonia</i> in New Caledonia. |
| 1420 | Callan, E. McC. | Changing status of the parasites of potato tuber moth <i>Phthorimaea operculella</i> in Australia. |
| 1440 | Taylor, K. L. | Evaluation of parasites introduced against <i>Sirex noctilio</i> in Australia. |
| 1500 | Snowball, G. J. | Status of natural enemies of white wax scale <i>Gascardia destructor</i> in eastern Australia. |
| 1520 | Tea break | |
| 1550 | Cumber, R. A. | The varying influence of <i>Euxanthellus philippiae</i> , parasite of <i>Ceroplastes sinensis</i> on mangrove in New Zealand. |
| 1610 | Endrödy-Younga, S. | Towards the biological control of oil palm hispid in Ghana. |
| 1630 | Lim, G. T. | The biological control of sugar cane borers in Perak, West Malaysia. |
| 1650 | Galichet, P. F. | Factors of competition between three tachinid parasites of <i>Diatraea saccharalis</i> . |
| 1710 | Ajibola-Taylor, T. | Studies on a scelionid egg-parasite of <i>Acanthomia tomentosicollis</i> (Coreidae). |

SECTION 7

BIOLOGICAL CONTROL: GENERAL SESSION

Organiser: E. McC. Callan

Friday, 25 August

Room O

Chairman: E. McC. Callan

1400	Hassan, E.	The importance of wild flowers and bush growth as a source of food for adult parasitic Hymenoptera.
1420	Ben Saad, A. A. and Bishop, G. W.	The use of food sprays to augment the natural enemies of potato insects.
1440	Biliotti, E. et al	Influence of the evolution of certain morphological and physiological processes of the host on the success fo parasitism.
1500	Ghani, M. A. and Mohyuddin, A. I.	Significance of basic studies in biological control.
1520	Tea break	
1550	Wyatt, I. J.	The principles of biological control in glasshouses.
1610	Gerling, D. and Schwartz, A.	Differences in the longevities of mated and unmated <i>Telenomus remus</i> living solitarily and in groups.
1630	Bragg, D. E.	Avoidance of superparasitism by <i>Phaenogenes cynarae</i> .
1650	Beard, R. L.	Ants as natural control agents for the eastern subterranean termite.
1710	Tauber, M. J. and Tauber, C. A.	Phenology of reproduction in a population on insect predators.

SECTION 7

BIOLOGICAL CONTROL:
IMPORTANCE OF SYSTEMATICS FOR
BIOLOGICAL CONTROL

Organizer: E. McC. Callan

Monday, 28 August

Room O

Chairman: C. W. Sabrosky

1400	Rosen, D. and De Bach, P.	Comparative morphology in the recogni- tion of cryptic species.
1420	Sailer, R. I.	The inventory of beneficial insects.
1440	Anneck, D. P.	Problems of systematics of scale insect parasites.
1500	Discussion	
1520	Tea break	
1550	Burks, B. D.	The place of the taxonomist in projects to achieve biological control.
1610	Mackauer, M.	Post-colonization changes in introduced insect parasites.
1630	Greathead, D. J.	Systematic relationship and host range.
1650	Discussion	

**SECTION 7 BIOLOGICAL CONTROL:
INSECT PATHOLOGY**

Organizer: E. McC. Callan

Tuesday, 29 August

Room O

Chairman: A. M. Heimpel

- | | | |
|------|-------------------------|---|
| 1400 | Zelazny, B. | Studies on ecology of a virus disease in the population of <i>Oryctes rhinoceros</i> in Western Samoa. |
| 1420 | Pinnock, D. E. | Microbial control of <i>Schizura concinna</i> on ornamental trees in California. |
| 1440 | Webster, J. M. | The effective use of nematodes as biocontrol agents of insect pests. |
| 1500 | Monty, J. | Microbial control of <i>Oryctes rhinoceros</i> in Mauritius with the virus <i>Rhabdionvirus oryctes</i> . |
| 1520 | Tea break | |
| 1550 | Hitchcock, J. D. | Effect of temperature on amoeba infection of the malpighian tubules of the honey bee. |
| 1610 | Entwistle, P. F. | Gradients of dispersal of an insect virus disease. |
| 1630 | Yendol, W. G. | Use of microbial pathogens to suppress gypsy moth <i>Porthetria dispar</i> populations. |
| 1650 | Jafri, R. H. | Potentialities of radiations for inhibiting the disease of insects reared on a mass scale. |

SECTION 8
(Jointly with
Section 4)

NON-INSECTICIDAL CONTROL:
INSECT PHEROMONES

Organizer: R. J. Bartell

Wednesday, 23 August

Room H

Chairman:

- | | | |
|------|--|--|
| 1400 | Hummel, H. E. | Major constituents of the trail pheromone of the Californian damp wood termite <i>Zootermopsis nevadensis</i> . |
| 1420 | Edgar, J. A. and
Culvenor, C. C. J. | Dihydropyrrolizine pheromones. |
| 1440 | Robertson, P. L.
and Orton, C. J. | Pheromones involved in defensive behaviour in an Australian species of <i>Camponotus</i> (Formicidae). |
| 1500 | Minks, A. K. | Five years of phenological observations of the summerfruit tortricid, <i>Adoxophyes orana</i> with sex traps. |
| 1520 | Tea break | |
| 1550 | Fletcher, B. S. | Laboratory and field studies of the response of females to the male sex pheromone of the Queensland fruit fly, <i>Dacus tryoni</i> . |
| 1610 | Maddison, P. A. | The development of attractant trapping systems for <i>Oryctes rhinoceros</i> (Coleoptera). |
| 1630 | Henzell, R. F. | Pheromones of insects in New Zealand: phenol for the control of grass grub <i>Costelytra zealandica</i> (Coleoptera). |

SECTION 8

NON-INSECTICIDAL CONTROL:
GENERAL SESSION

Organizer: R. J. Bartell

Thursday, 24 August

Room C

Chairman:

1400	Smith, F. F.	Repellant soil mulches for protecting crops from phytophagous insects and virus disease infection.
1420	Saxena, K. N. and Sharma, R. N.	Combination of behavioural and hormonal principles for insect control.
1440	van Emden, H. F.	Predicting plant susceptibility or resistance to pests from plant characteristics.
1520	Tea break	
1550	Ascher, K. R. S. and Ishaaya, I.	Experiments to elucidate the mode of action of an organotin antifeedant in larvae of the Egyptian cotton leafworm, <i>Spodoptera littoralis</i> .
1610	Munakata, K.	Insect antifeedants in plants.
1630	Fenemore, P. G.	Insect moulting hormone and toxic substances in New Zealand plants.
1650	Whitehead, V. B. and Rust, D. J.	Fruit-piercing moths: ecology and control.
1710	Afify, A. M. and Merdan, A. I.	Variation in bacteriostatic activity of different plant species with the age of foliage.

SECTION 8

NON-INSECTICIDAL CONTROL: GENERAL SESSION

Organizer: R. J. Bartell

Friday, 25 August

Room C

Chairman:

- | | | |
|------|---|---|
| 1400 | Pristavko, V. P. | Optimal control of insect rearing and radiation sterilization. |
| 1420 | Chiang, J. Ju-Hu | Sterilization of adult rice stem borer (<i>Chilo suppressalis</i>). |
| 1440 | Enkerlin, D. S.,
Flores, R. G. and
Mathieu, J. M. | Induction of diapause in <i>Heliothis</i> spp. and the effect of gamma radiation on diapausing pupae. |
| 1500 | Silva, G. M. | Contribution to the mass rearing of the olive fruit fly (<i>Dacus oleae</i>). |
| 1520 | Tea break | |
| 1550 | Economopoulos, A. P. | Mating activity and competitiveness of artificially reared (males normal or y-ray sterilized) and wild <i>Dacus oleae</i> . |
| 1610 | Cavalloro, R. and Delrio, G. | Gamma sterilization and sexual competitiveness in the olive fruit fly (<i>Dacus oleae</i>). |
| 1630 | Bailey, P. T. | The health of radiation-sterilized <i>Dacus cucumis</i> (Tephretidae). |
| 1650 | Shaw, J. G. | Ten years of sterile Mexican fruit fly releases in Mexico. |

SECTION 8

NON-INSECTICIDAL CONTROL: GENERAL SESSION

Organizer: R. J. Bartell

Monday, 28 August

Room C

Chairman:

- | | | |
|------|----------------------------|--|
| 1400 | Landa, V. | Juvenile hormone analogues as chemosterilants. |
| 1420 | Laugé, G. and Masner, P. | Sterilizing effect of high temperatures on <i>Drosophila melanogaster</i> . |
| 1440 | Steffan, A. W. | Proposals for the application of genetical control techniques in the eradication of harmful aphid species. |
| 1500 | Hafez, M. and Osman, M. F. | Field and laboratory experiments with certain chemosterilants for control of <i>Musca domestica vicina</i> . |

SECTION 9

POPULATION MANAGEMENT AND INTEGRATED CONTROL: MANAGEMENT OF SOME MEDICAL AND VETERINARY PESTS

Organizer: P. W. Geier

Wednesday, 23 August

Room A

Chairman: K. R. Norris

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|------|--|--|
| 1400 | Bornemissza, G.
and Ferrar, P. | Film "Dung Down Under". |
| 1440 | Breyev, K. A. | On some general principles in the control
of parasitic arthropods, with particular
reference to warbleflies. |
| 1500 | Sutherst, R. W. and
Wharton, R. H. | The management of populations of the
cattle tick in Australia. |
| 1520 | Tea break | |
| 1550 | Hansens, E. J. | Integrated control of blood-sucking Dip-
tera in sea-shore areas. |
| 1610 | Stampa, S., Londt,
J. G. H. and
Whitehead, G. B. | The effect of the alteration of environ-
ment on the populations of <i>Amblyomma</i>
<i>hebraeum</i> . |

A COOPERATIVE PROGRAMME OF RESEARCH INTO PEST MANAGEMENT IN AUSTRALIA

Chairman: P. S. Corbet

- | | | |
|------|--------------|--|
| 1630 | Geier, P. W. | A cooperative programme of research into
the management of pome-fruit pests in
S.E. Australia: I: Ecology. |
| 1650 | Madge, P. E. | A cooperative programme of research into
the management of pome-fruit pests in S. |

1710 Morris, D. S.

E. Australia: II: Reducing rate of insecticide as a first step in integrated control.

A cooperative programme of research into the management of pome-fruit pests in S. E. Australia: III: Evaluation of a nuclear granulosis virus for control of codling moth.

SECTION 9 POPULATION MANAGEMENT AND INTEGRATED CONTROL: ECOLOGY AND CONTROL OF CROP PESTS, PART I

Organizer: P. W. Geier

Thursday, 24 August

Room E

Chairman: Th. Wildbolz

- | | | |
|------|-----------------------------|--|
| 1400 | Ito, Y. and
Iwahashi, O. | Ecological problems in the eradication of <i>Dacus dorsalis</i> from the southern islands of Japan. |
| 1420 | Ota, A. K. | Some theoretical considerations on the use of partially-resistant varieties for insect-pest management programmes. |
| 1440 | d'Aguilar, J. | Aetiology of some unusual instances of outbreaks in populations of insects, with special reference to integrated control. |
| 1500 | Richardson, N. L. | The ecology of oriental fruit moth <i>Cydia molesta</i> in relation to other pests of canning peaches in southern Australia. |
| 1520 | Tea break | |
| 1550 | Jones, E. L. | <i>Chironomus tepperi</i> and agronomic developments in rice growing. |
| 1610 | Wyatt, I. J. | Problems of the commercial development of integrated control. |
| 1630 | Harpaz, I. | Non-chemical control of the lucerne-seed chalcid in Israel. |

**SECTION 9 POPULATION MANAGEMENT AND
INTEGRATED CONTROL:
ECOLOGY AND CONTROL OF CROP
PESTS, PART II**

Organizer: P. W. Geier

Thursday, 24 August

Room A

Chairman: W. P. Stephen

- | | | |
|------|--------------------|--|
| 1400 | Danthanarayana, W. | The importance of alternate host plants in the management of light brown apple moth. |
| 1420 | Stengel, M. M. C. | The European corn borer in Alsace. |
| 1440 | Rabb, R. L. et al. | Population patterns of <i>Heliothis zea</i> and <i>H. virescens</i> — A progress report. |
| 1500 | MacLellan, C. R. | Codling moth populations under natural, integrated, and chemical control in Nova Scotia. |
| 1520 | Tea break | |
| 1550 | Bragg, D. E. | Influence of ethyl and methyl parathion on parasitoids of <i>Phytomyza atricornis</i> in artichokes. |
| 1610 | Clancy, G. | The role of the chemical manufacturer in the integrated control of pests of crops. |

SECTION 9 POPULATION MANAGEMENT AND INTEGRATED CONTROL: QUANTITATIVE MODELLING

Organizer: P. W. Geier

Friday, 25 August

Room E

Chairman: M. J. Dallwitz

- | | | |
|------|--|--|
| 1400 | May, R. M. | Stability versus time-delay in population models with two and three trophic levels. |
| 1420 | Goh, B. S., Leitman, G. and Vincent, T. L. | Optimal control of the prey-predator system. |
| 1440 | Hillman, T. J. | A step in simulation-assessment of sterile-release control of light brown apple moth. |
| 1500 | Berryman, A. A. and Pienaar, L. V. | Systems simulation in insect population dynamics and pest management. |
| 1520 | Tea break | |
| 1550 | Rabinovich, J. E. | Computer simulation of population growth and regulation in <i>Triatoma infestans</i> with an analysis of control strategies. |

SECTION 9 POPULATION MANAGEMENT AND INTEGRATED CONTROL: ECOLOGY AND THE ECONOMICS OF CROP PEST CONTROL

Organizer: P. W. Geier

Friday, 25 August

Room A

Chairman: R. W. Stark

- | | | |
|------|---|---|
| 1400 | Bedford, E. C. G. | Populations of citrus pests and other aspects of integrated control. |
| 1420 | Whitehead, V. B.
and DeKock, A. | Reduction of mealybug populations in vineyards in the Western Cape Province, South Africa. |
| 1440 | Wearing, C. H. | Ryania for management of a univoltine codling moth population. |
| 1500 | Thomas, W. P. | Factors influencing the integrated control of light-brown apple moth in New Zealand. |
| 1520 | Tea break | |
| 1550 | Ellington, J. J. | Approaches to a complete cotton insect management system: II. The construction tance studies and efficient sampling techniques. |
| 1610 | Ellington, J. J.
Flachs, G. M. and
Atmar, J. W. | Approach to a complete cotton insect management system: II. the construction of an automatic large-scale insect identification and counting system. |
| 1630 | Stern, V. M. | The economics of overkill. |
| 1650 | Southwood, T. R. E.
and Norton, G. H. | Economic aspects of pest management: strategies and decisions. |

**SECTION 9 POPULATION MANAGEMENT AND
INTEGRATED CONTROL:
INTEGRATED CONTROL IN
DIFFERENT COUNTRIES, PART I**

Organizer: P. W. Geier

Monday, 28 August

Room A

Chairman: M. E. Solomon

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|------|-------------------|---|
| 1400 | MacLaren, I. W. | Integrated control of insect pests on citrus fruits in Victoria, Australia. |
| 1420 | Tao, C. C. | Citrus insect control in Taiwan and a new integrated control method. |
| 1440 | Cochereau, P. L. | Population management of the fruit-sucking moth <i>Othreis fullonia</i> in New Caledonia. |
| 1500 | Helson, G. A. H. | Integrated pest control and pasture pests in New Zealand. |
| 1520 | Tea break | |
| 1550 | Giliomee, J. H. | Practical problems in the implementation of integrated control in South Africa. |
| 1610 | Gruys, P., et al. | Present status of integrated control of orchard pests in the Netherlands. |
| 1630 | Thygesen, Th. | Integrated control in Denmark. |
| 1650 | Biliotti, E. | Pest management studies in France. |

**SECTION 9 POPULATION MANAGEMENT AND
INTEGRATED CONTROL:
INTEGRATED CONTROL IN
DIFFERENT COUNTRIES, PART II**

Organizer: P. W. Geier

Tuesday, August 29

Room A

Chairman: M. A. Bateman

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|------|--------------------|---|
| 1400 | Franz, J. M. | The role of biological control in pest management. |
| 1420 | Pradhan, S. | Philosophy and feasibility of integrated pest control. |
| 1440 | Kiritani, K. | Strategy in the integrated control of rice pests. |
| 1500 | Dyck, V. A. | Ecology of two species of rice pests in relation to control. |
| 1520 | Tea break | |
| 1550 | Jotwani, M. G. | Integrated control schedule for the important pests of sorghum. |
| 1610 | Saini, R. S. | An integrated programme for suppression of the lesser canna leafroller in south-eastern United States. |
| 1630 | Edwards, B. A. B. | An approach to integrated control of orchard mites and the tortricid <i>Epiphyas postvittana</i> in southern Australian orchards. |
| 1650 | Dobrovolsky, B. V. | The strategy of plant protection against pests in agriculture and forestry. |

SECTION 10

INSECTICIDES:
TOXICOLOGY

Organizer: J. T. Snelson

Wednesday, 23 August

Room D

Chairman: J. T. Snelson

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|------|-----------------------------------|--|
| 1400 | Knowles, C. O. | Mode of action of formetanate and form-
paranate acaricides. |
| 1420 | Treece, R. E. | Rabon as a cattle feed supplement for fly
control. |
| 1440 | Shipp, E. | Activity of compounds designed on a
theory of DDT mode of action. |
| 1500 | Persing, C. O.
and Menn, J. J. | R-20458, a promising new juvenile hor-
mone analog. |
| 1520 | Tea break | |

Chairman: C. O. Persing

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|------|--------------------------------|---|
| 1550 | Saxena, S. C. | Pyrethrum as a stomach poison. |
| 1610 | Ford, M. G. and
Reay, R. C. | The effects of some newer pyrethroids on
the armyworm, <i>Spodoptera littoralis</i> and
some other pests. |
| 1630 | Wickham, J. C. | The use of logarithmic isoboles in assess-
ing the cost and efficiency of mixtures of
insecticide plus synergist. |
| 1650 | Buchanan, R. S. | Chlorpyrifos cattle louse ovicide. |
| 1710 | Mulder, R. | 1-(2,6-disubstituted-benzoyl)-3-(pheynl)-
ureas, a new group of insecticidal com-
pounds. |

SECTION 10

INSECTICIDES: SIDE EFFECTS

Organizer: J. T. Snelson

Thursday, 24 August

Room D

Chairman: E. P. Lichtenstein

- 1400 Thomsen, W. Correlation of DDT use in California with decline of Pacific sardine, *Sardinops caerulea*.
- 1420 Sherman, R. W. "Artifacts" and "mimics" of DDT and other organochlorine insecticides.
- 1440 Zabik, M. J. The uptake and distribution of DDE by *Chironomus tentans* and its effect on egg viability.
- 1500 Martin, N. A. The effect of insecticides on the soil and pasture fauna.

1520 Tea break

Chairman: R. W. Sherman

- 1550 Laskowski, D. A.,
Hamaker, J. W.,
Regoli, A. J. and
Hunter, R. C. Environmental factors affecting the degradation and insecticidal efficacy of chlorpyrifos.
- 1610 Shilova, S. A. Prospects for substitution of DDT by less persistent insecticides in foci of some natural infections of human disease.
- 1630 Lichtenstein, L. P. Environmental factors affecting the fate of pesticides.

SECTION 10

INSECTICIDES: RESISTANCE

Organizer: J. T. Snelson

Friday, 25 August

Room D

Chairman: A. W. A. Brown

- 1400 **Grayson, J. McD.** Resistance to insecticides in cockroaches—present situation and reproductive and morphological comparisons between strains.
- 1420 **Whitehead, G. B.** The state of organophosphate resistance in *Boophilus decoloratus* in South Africa.
- 1440 **Stone, B. F.** Multiple allelism, brain cholinesterases and resistance to organophosphorus acaricides in the cattle tick *Boophilus microplus*.
- 1500 **Nolan, J. and
Schnitzerling, H. J.** Separation and characterization of multiple forms of acetylcholinesterase from organophosphorus resistant and susceptible strains of the cattle tick *Boophilus microplus*.
- 1520 Tea break

Chairman: J. R. Busvine

- 1550 **Shanahan, G. J. and
Roxburgh, N. A.** Selection advance with diazinon in organophosphorus resistant strains of *Lucilia cuprina*.
- 1610 **Roxburgh, N. A.** A technique for testing early instar larvae of the Australian sheep blowfly.
- 1630 **Arnold, J. T. A.** Population genetics of organophosphate resistance in the Australian sheep blowfly.

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|------|------------------------|--|
| 1650 | Maunder, J. W. | Control of human head-lice in areas where organochlorine insecticide resistance has developed. |
| 1700 | Morrison, F. O. | Characteristics of a DDT resistant strain of mice. |
| 1710 | Hodgson, E. | Cytochrome P-450 in insects: characterization and role in insecticide resistance. |

SECTION 11

MEDICAL AND VETERINARY ENTOMOLOGY: MOSQUITOES

Organizer: R. H. Wharton

Wednesday, 23 August

Room F

Chairman: A. R. Barr

- 1400 **Laird, M.** Larval mosquito ecology in relation to mosquito control.
- 1420 **Trpis, M.** Effect of temperature on development and predatory behaviour of *Toxorhynchites brevipalpis*.
- 1430 **Trpsis, M.** Breeding of *Aedes aegypti* and *A. simpsoni* in shells of the giant African snail *Achatina fulica* in East Africa.
- 1440 **Chowdaiah, B. N.
 and Rajasekharan,
 P.T.** Influence of larval colour on the feeding habits of two major predators of mosquito larvae.
- 1500 **Spencer, M.** *Anopheles farauti* in the outdoor-biting situation.
- 1520 **Tea break**

Chairman: M. Laird

- 1540 **Bidlingmayer, W. L.** Changes in composition of mosquito population in relation to nocturnal illumination.
- 1600 **Gerberg, E. J.
 and Kutz, F. W.** A mosquito test system for screening antifilarial compounds.
- 1620 **Chinery, W. A.** Observations on *Culex thalassius* in Accra and Tema, Ghana.
- 1650 **Kelly, M. W.,
 Raghow, R. S. and
 Dalgarno, L.** The growth of arboviruses in continuous mosquito cell lines.
- 1710 **Guptavanij, P.** The biting cycle of *Mánsonia bonneae* and *M. dives* in the southern part of Thailand.

SECTION 11

MEDICAL AND VETERINARY ENTOMOLOGY: TICKS

Organizer: R. H. Wharton

Wednesday, 23 August

Room E

Chairman: R. O. Drummond

- 1400 Feldman-Muhsam, B. Autogeny in *Ornithodoros tholozani*.
- 1420 Leahy, M. G.,
 VendeHey, R. and
 Galun, R. Assembling in *Argas persicus*.
- 1440 Doube, B. M. Adaptations of the argasid tick *Ornithodoros gurneyi* to the behaviour of its host *Megaleia rufa*, a scarce desert dwelling kangaroo.
- 1500 Kitaoka, S. Effects of ecdysones on ticks, especially on *Ornithodoros moubata*.
- 1520 Tea break

Chairman: B. Feldman-Muhsam

- 1550 Kemp, D. H. and
 Koudstaal, D. Behaviour of cattle-tick larvae in relation to host resistance and to sites of predilection for feeding.
- 1610 Cerňý, V., Daniel, M.,
 and Rosický, B. Some features of the development cycle of the tick *Ixodes ricinus*.
- 1630 Allen, J. R. Immunity to ticks: cutaneous basophil reactions in immune guinea pigs.
- 1650 Barker, R. Studies on the composition of Lone Star tick (*Amblyomma americanum*) oral secretions.
- 1710 Hoogstraal, H. Tickborne viruses of birds: ecology and zoogeography.

SECTION 11

MEDICAL AND VETERINARY
ENTOMOLOGY:
BEHVIOURAL ASPECTS OF
TRAPPING BITING ARTHROPODS

Organizer: R. H. Wharton

Thursday, 24 August

Room F

Chairman: W. L. Bidlingmayer

- 1400

Kettle, D. S.

Relative importance of factors. which
might influence the biting rate of
Culicoides.
- 1420

Turner, E. C. Jr.
and Tanner, G. D.

A comparison of three special trapping
methods to investigate daily and seasonal
activity of *Culicoides*.
- 1440

Lewis, D. J.

Aspects of trapping Phlebotomidae and
Simuliidae.
- 1520

Tea break
- 1550

Dyce, A. L. and
Standfast, H. A.

Collection of Australian *Phlebotomus* for
virus testing.
- 1610

Hansens, E. J.

Use of traps for survey and control of
Tabanidae: Diptera on the New Jersey
salt marsh.
- 1630

Hair, J. A.

Carbon dioxide traps as a tool for
measuring distribution and abundance of
various tick species.
- 1650

Coz, J. F. M.

Light-reflecting C.D.C. traps and epidem-
iology of malaria.

SECTION 11

MEDICAL AND VETERINARY ENTOMOLOGY: THE EMERGING IMPORTANCE OF CERATOPOGONIDAE IN MEDICAL AND VETERINARY ENTOMOLOGY

Organizer: M. D. Murray

Friday, 25 August

Room F

Chairman: D. S. Kettle

- | | | |
|------|----------------------------------|--|
| 1400 | Jones, R. H. | Laboratory studies on transmission of virus diseases by <i>Culicoides variipennis</i> . |
| 1420 | Lee, V. H. | Isolation of viruses from field populations of <i>Culicoides</i> . |
| 1440 | Kitaoka, S. | Recent progress in research on chicken leucocytozoonosis in Japan. |
| 1500 | Lee, D. J. | Ceratopogonidae as pests of man in Australia. |
| 1520 | Tea break | |
| 1550 | Downes, J. A. | The bionomics of adult Ceratopogonidae — a review. |
| 1610 | Dyce, A. L. and Standfast, H. A. | A comparison of the flight patterns of <i>Culicoides</i> and other blood-sucking Nematocera. |
| 1630 | Linley, J. R. | Environmental adaptations of immature Ceratopogonidae. |
| 1650 | Turner, E. C. Jr. | The creation of artificial environments for laboratory rearing of <i>Culicoides</i> larvae. |
| 1710 | Sun, W. K. C. | Laboratory colonization of Ceratopogonidae. |
| 1720 | Discussion | |

SECTION 11

MEDICAL AND VETERINARY ENTOMOLOGY: REPRODUCTION OF ARTHROPODS OF MEDICAL AND VETERINARY IMPORTANCE

Organizer: J. H. Oliver

Monday, 28 August

Room E

Chairman: J. H. Oliver

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|------|-------------------|--|
| 1400 | King, R. C. | Insect gametogenesis. |
| 1420 | Anderson, J. R. | Meeting of the sexes. |
| 1440 | Hinton, H. E. | Sperm transfer in insects of medical and veterinary importance. |
| 1500 | Discussion | |
| 1520 | Tea break | |
| 1550 | Oliver, J. H. Jr. | Reproduction in mites and ticks. |
| 1610 | Barr, A. R. | Reproduction in mosquitoes and other Diptera. |
| 1630 | Davey, K. G. | Reproduction in other arthropods of medical and veterinary importance. |
| 1650 | Discussion. | |

SECTION 11

MEDICAL AND VETERINARY ENTOMOLOGY: GENERAL SESSION

Organizer: R. H. Wharton

Monday, 28 August

Room F

Chairman: D. J. Lee

- | | | |
|------|-------------------|---|
| 1400 | Nutting, W. B. | Demodids of medical-veterinary importance: status and problems. |
| 1420 | Markevitch, A. P. | Studies in field of medical and veterinary entomology in the Ukraine. |
| 1440 | Southcott, R. V. | Survey of injuries to man by Australian terrestrial arthropods. |
| 1500 | Saliba, L. J. | A preliminary study on shape discrimination in house flies. |
| 1520 | Tea break | |

Chairman: K. R. Norris

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|------|---|---|
| 1550 | Sutherst, R. W. | The assessment of favourability of habitats for the tick <i>Boophilus microplus</i> in Australia. |
| 1610 | Bar-Zeev, M. | Laboratory evaluation of tick repellents. |
| 1630 | Drummond, R. O.,
Gladney, W. J. and
Darrow, D. I. | Sampling of populations of the lone star tick <i>Amblyomma americanum</i> with CO ₂ -baited traps. |
| 1650 | Dremova, V. P. | Effectiveness of using repellents against arthropod vectors of infections. |
| 1710 | Tyndale-Biscoe, M. | A combination of two ageing techniques for age determination in the sheep blowfly <i>Lucilia cuprina</i> . |

SECTION 11

MEDICAL AND VETERINARY ENTOMOLOGY: SPECIES COMPLEXES IN MEDICALLY IMPORTANT ARTHROPODS

Organizer: R. H. Wharton

Tuesday, 29 August

Room E

Chairman: I. M. Mackerras

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|------|-----------------|--|
| 1400 | Dunbar, R. W. | Speciation in the <i>Simulium</i> (<i>Edward-sellum</i>) <i>damnosum</i> complex. |
| 1420 | Bryan, J. H. | Studies on the species of the <i>Anopheles punctulatus</i> complex. |
| 1440 | Green, C. A. | The <i>Anopheles annulipes</i> complex of species. |
| 1500 | Paterson, H. E. | Reproductive isolation between members of the <i>Culex pipiens</i> complex in Western Australia. |
| 1520 | Tea break | |

TAXONOMY, BIOLOGY AND GENETICS IN *MUSCA*

Organizer: H. E. Paterson

Chairman: H. E. Paterson

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|------|-----------------------|--|
| 1550 | Paterson, H. E. | The <i>Musca domestica</i> complex — the present position. |
| 1610 | Stoffolano, J. G. Jr. | Behavioural studies of the genus <i>Musca</i> . |

- 1630 Keiding, J. Aspects of behaviour and ecology of *Musca domestica* in Northern Europe.
- 1650 Wagoner, D. E. Generic characteristics of the house fly including anomalous factors.
- 1710 Jones, R. The adaptive strategies of three species of dung-breeding *Musca* (*vetustissima*, *autumnalis*, and *sorbens*).

SECTION 11 MEDICAL AND VETERINARY ENTOMOLOGY: GENERAL SESSION

Organizer: R. H. Wharton

Tuesday, 29 August

Room F

Chairman: J. R. Busvine

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|------|--|---|
| 1400 | Ford, J. | The behaviour of <i>Glossina</i> in relation to the epidemiology of human sleeping sickness. |
| 1420 | Adkins, T. R. Jr. | Biology and control of Tabanidae affecting recreational areas in South Carolina. |
| 1440 | Taylor, B. | Laboratory observations on the timing of flight activity in mosquitoes. |
| 1500 | Anderson, J. R.
and Weinmann, C. J. | The population dynamics, parity profiles and infection rates of the tabanid vectors of <i>Elaeophora schneideri</i> (Filariidae) in California. |
| 1520 | Tea break | |

Chairman: J. Ford

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|------|----------------------------------|---|
| 1550 | Busvine, J. R. | Current research on the etiology and control of Triatomid vectors of Chagas' Disease. |
| 1610 | Rabinovich, J. E. | Vital statistics of <i>Rhodnius prolixus</i> under laboratory conditions. |
| 1630 | Zeledon, R. | Biology and ethology of some species of Triatominae. |
| 1650 | Knapp, F. W. | An ecological study of <i>Oestrus ovis</i> . |
| 1710 | Abul-Hab, J. and
Al-S'adi, H. | Seasonal occurrence of <i>Hypoderma</i> warble flies in Baghdad area, Iraq. |

SECTION 12

AGRICULTURAL ENTOMOLOGY: WORLD CROP PROTECTION

Organizer: G. Pasfield

Wednesday, 23 August

Room G

Chairman: G. Pasfield

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|------|-----------------------|--|
| 1400 | Pradhan, S. | Revolution in pest control paved the way for Green Revolution. |
| 1420 | Osmun, J. V. | Educational competencies needed for continued use of insecticides. |
| 1440 | Reed, W. | The future of cotton pest control in Uganda. |
| 1500 | Whitney, W. K. | Observations on cowpea insects at the International Institute of Tropical Agriculture. |
| 1520 | Tea break | |

Chairman: D. F. Waterhouse

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|------|--|---|
| 1550 | Ling, L., Whittemore, F. W. and Buyckx, E. J. | Plant pest control on the international front. |
| 1610 | Barry, D. | Breeding for host plant resistance to sorghum shoot fly in East Africa. |
| 1630 | Staal, G. B., Bhasharen, G. and Nassar, S. | Novel juvenile hormone analogs with high activity and promise for selective pest control. |
| 1650 | Johnson, W. T. | An international entomology organization for teenage youth. |

SECTION 12

AGRICULTURAL ENTOMOLOGY:
BIOLOGY AND ECOLOGY OF
ECONOMIC INSECTS

Organizer: G. Pasfield

Thursday, 24 August

Room G

Chairman: T. A. Taylor

- 1400

Hidaka, T. and
Vungsirabutr, P.

Studies on effect of the growing stages of rice plants on gall formation and larval development of the rice gall midge in Thailand.
- 1420

Chen, C. B., Yap,
H. T. and Yong, F. W.

The life cycle of the big moth borer, *Phragmataecia castaneae* and its destruction of sugarcane in West Malaysia.
- 1440

Elder, R. J.

Research into *Oncopera* spp. as pests of pasture in north Queensland.
- 1500

Knutson, H.,
Campbell, J. B.,
Arnett, W. H. et al.

Seasonal histories and hostplant relationships of Acrididae inhabiting a tall grass prairie in eastern Kansas.
- 1520

Tea break
- 1550

Jones, M. G.

Factors affecting the survival and multiplication of wheat bulb fly, a pest of winter wheat.
- 1610

Materu, M. E. A.
and Kettle, D. S.

Laboratory observations on the bionomics of *Acanthomia* spp.
- 1630

Li, C. S.

Biological and ecological studies of the rice bug *Leptocorisa oratorius*, and its control.
- 1650

Carnegie, A. J. M.

Egg mortality of *Nemicia viridis* (Homoptera) in sugarcane and in indigenous hosts.
- 1710

Barrett, J. H.

Termite mound temperatures under tropical conditions.

SECTION 12

AGRICULTURAL ENTOMOLOGY: ENVIRONMENT AND PRODUCTION RELATIONSHIPS OF ECONOMIC INSECTS

Organizer: G. Pasfield

Monday, 28 August

Room G

Chairman: S. Pradhan

- | | | |
|------|-----------------------------------|--|
| 1400 | Alimdzhanov, R. A. | The pattern of entomofauna harmful to cotton plants in Uzbekistan. |
| 1420 | Greenup, L. R. | Migration and outbreaks of <i>Pseudaletia convecta</i> (Noctuidae) in New South Wales. |
| 1440 | Rai, B. K. | Estimation of losses caused by paddy bug. |
| 1500 | Allen, P. G. | Sequential plan for assessment of damage by <i>Aphodius tasmaniae</i> (Scarabaeidae) in pastures in South Australia. |
| 1520 | Tea break | |
| 1550 | Atlavinyte, O. and Sukachiene, I. | Dynamics of the densities of Collembola in the process of straw humification in relation with life activities of earthworms. |
| 1610 | Wood, T. G. and Lee, K. E. \ | The significance of termites in the cycling of soil organic matter. |
| 1630 | Schurr, K. | Insect protein in food recycled from sewage lagoon biomass. |
| 1650 | Rogers, D. J. | An investigation of <i>Hedylepta diemenalis</i> (Lepidoptera) as a pasture pest in south east Queensland. |

SECTION 12 AGRICULTURAL ENTOMOLOGY: PATTERNS OF INSECT CONTROL

Organizer: G. Pasfield

Tuesday, 29 August

Room G

Chairman: J. M. Hoy

- | | | |
|------|---|--|
| 1400 | Rai, B. K. | Chemical control of coconut caterpillar, <i>Brassolis sophorae</i> , and moth borer, <i>Castnia daedalus</i> . |
| 1420 | Afify, A. M.
and Zaki, F. N. | Relative susceptibility to endrin of <i>Spodoptera littoralis</i> and an associated entomophagous beetle as influenced by field application. |
| 1440 | Danthanarayana, W. | Fumigation as a method of controlling dry-wood termites. |
| 1500 | Köhler, P.E. | New methods of locust control. |
| 1520 | Tea break | |
| 1550 | MacQuillan, M. J.,
Campbell, B. L.
and Edwards, B. A. | Effective control of two-spotted mite and European red mite in Australia with Plictran. |
| 1610 | Matthews, G. A. | Ultra-low volume spray application on cotton in Malawi. |
| 1630 | Agee, H. R. | The use of sound and light to control the bollworm moth. |
| 1650 | Anderson, L. D.
and Atkins, E. L. | Laboratory and field techniques for testing the effect of pesticides on honey bees. |

SECTION 13

FOREST ENTOMOLOGY: INSECT/TREE INTERACTIONS

Organizer: F. D. Morgan

Wednesday, 23 August

Room B

Chairman: K. L. Taylor

- | | | |
|------|-------------------|--|
| 1400 | Gray, B. | Forest insect problems in the South Pacific Islands. |
| 1420 | Canakcioglu, H. | Aphid forest relationship in Turkey. |
| 1440 | Mazanec, Z. | The effect of defoliation by the leaf miner <i>Perthida glyphopa</i> (Lep.) on the growth of jarrah. |
| 1500 | Cavalca'selle, B. | Preliminary observations on eucalypt wood borers in Italy. |
| 1520 | Tea break | |

BIOLOGICAL CONTROL OF FOREST PESTS

- | | | |
|------|----------------|--|
| 1550 | Bungey, R. S. | Tussock moth outbreaks in <i>Pinus radiata</i> plantations of South Australia. |
| 1610 | Weseloh, R. M. | Adult behaviour of the Gypsy Moth and some parasitoids under field conditions. |
| 1630 | Golosova, M. | The activity of insect pathogens against <i>Tortrix viridana</i> . |

SECTION 13
(Jointly with
Sections 12
and 15)

FOREST ENTOMOLOGY:
POPULATION DAMAGE AND
ASSESSMENT

Organizer: F. D. Morgan

Wednesday, 23 August

Room I

Chairman: D. M. Benjamin

- | | | |
|------|----------------------|--|
| 1400 | Morgan, F. D. | Methods of assessing populations of pests and the damage they do. |
| 1440 | Laughlin, R. | Estimation of the numbers of thrips in a patch of Eucalyptus scrub. |
| 1500 | White, T. C. R. | Sampling <i>Cardiaspina densitexta</i> on pink gum in South Australia. |
| 1520 | Tea break | |
| 1550 | Wood, B. J. | The effect of pest damage on oil palm production. |
| 1610 | Madden, J. L. | Estimating survival and mortality of wood-wasps within trees. |
| 1630 | Discussion by panel. | |

SECTION 13
(Jointly with
Section 12
and 15)

FOREST ENTOMOLOGY:
THE INTEGRATED CONTROL OF
TREE PESTS

Organizer: F. D. Morgan

Thursday, 24 August

Room I

Chairman: T. V. Bourke

- | | | |
|------|-------------------------|---|
| 1400 | Richardson, N. | Methods of developing integrated controls for pests of tree crops. |
| 1440 | Sharma, M. L. | Control measures against the pine needle scale in Quebec. |
| 1500 | Morgan, F. D. | An integrated control of <i>Chlenias pachymela</i> . |
| 1520 | Tea break | |
| 1550 | Shaw, J. G. | Virgin California red scale females in traps for detection of male scale activity in plantings. |
| 1610 | Gellatley, J. G. | <i>Tegolophus australis</i> , a rust mite affecting citrus in Australia. |
| 1630 | Discussion by panel | |

SECTION 13
(Jointly with
Sections 12
and 15)

FOREST ENTOMOLOGY:
OTHER DEVELOPMENTS IN THE
CONTROL OF TREE PESTS

Organizer: F. D. Morgan

Friday, 25 August

Room I

Chairman: S. Barras

- 1400

Howitt, A. J.

The use of pheromones, bait traps, and controlled porosity dispensers in controlling arthropod pests and diseases of deciduous fruit.
- 1440

Yie, S. T.

A study of the life history and control of rhinoceros beetle in Taiwan.
- 1500

Varty, I. W.

Monitoring ecological side effects of recurrent large-scale forest spraying operations.
- 1520

Tea break
- 1550

Nigam, P. C.

Evaluation of insecticides against forest insect pests and other components of the forest ecosystem.
- 1610

Gray, D. E.

Progress in subterranean termite studies in Southern Ontario.
- 1630

Discussion by panel

SECTION 13

FOREST ENTOMOLOGY: SYMBIOTIC RELATIONSHIPS

Organizer: F. D. Morgan

Tuesday, 29 August

Room D

Chairman: F. D. Morgan

- | | | |
|------|------------------|--|
| 1400 | Norris, D. M. | Nutritional interdependencies between certain <i>Xyleborus</i> spp. and their symbiotes — possible implications for control. |
| 1420 | Barras, S. | <i>Dendroctonus</i> — fungus symbiosis — nutritional basis for efficient destruction of pine. |
| 1440 | French, J. R. J. | Studies on the physiological interactions between an ambrosia beetle and its symbiotic fungus. |
| 1500 | Spradbery, J. P. | A comparative study of European woodwasps with reference to their phytotoxicity. |
| 1520 | Tea break | |

TAXONOMY AND BIONOMICS OF FOREST INSECTS

- | | | |
|------|-----------------------------------|--|
| 1550 | Vorontsov, A. I. | The review of the main species of Bostrychidae as the pests of some forest stands in the South Eastern regions of the U.S.S.R. |
| 1610 | Madden, J. L.
and Bashford, R. | The bionomics of <i>Chlenias</i> sp. |
| 1630 | Discussion by panel | |

SECTION 14

STORED PRODUCTS ENTOMOLOGY: THE DISTRIBUTION OF STORED PRODUCT INSECTS

Organizer: S. W. Bailey

Monday, 28 August

Room CS

Chairman: H. Jacob

- | | | |
|------|--------------------|--|
| 1400 | Hall, D. W. et al. | Some distribution aspects of tropical stored product pests. |
| 1420 | Banks, H. J. | The absence of <i>Trogoderma granarium</i> (Dermestidae) in Australia. |

THE PROTECTION OF STORED PRODUCTS WITH CHEMICALS

- | | | |
|------|-------------------|---|
| 1500 | Davis, R. | Research at Savannah with chemicals for the control of stored-product insects. |
| 1520 | Tea break | |
| 1550 | Todorovski, V. B. | Evaluation of hydrogen phosphide as a fumigant in the control of <i>Ephesia elutella</i> and <i>Lasioderma serricorne</i> and of its residues on treated tobacco bales. |
| 1610 | Bond, E. J. | Responses of stored product insects to the fumigant phosphine. |
| 1630 | Rai, B. K. | Chemical control of pests of paddy in storage. |
| 1650 | Dyte, C. E. | Resistance to compounds with juvenile hormone activity in a strain of <i>Tribolium castaneum</i> . |

SECTION 14 STORED PRODUCTS ENTOMOLOGY: THE BIOLOGICAL CONTROL OF PHYCITID MOTHS

Organizer: B. R. Champ

Tuesday, 29 August

Room CS

Chairman:

- | | | |
|------|---------------|--|
| 1400 | Brady, U. E. | Sex pheromones of phycitid pests of stored products. |
| 1420 | Takahashi, F. | An experimental study on the suppression and regulation of an <i>Ephestia</i> population by the action of a parasite wasp <i>Nemeritis</i> . |
| 1440 | Ashman, F. | The succession of Phycitinae attacking carob before and after harvest in the Middle East. |
| 1520 | Tea break | |

MISCELLANEOUS PAPERS

- | | | |
|------|----------------------------------|---|
| 1550 | Greening, H. G. | Hammermilling maize grain to control insects infesting farm-stored animal feed. |
| 1610 | Connell, M. | The planning and organization of measures designed to prevent and control insect pests in a major primary industry. |
| 1630 | Williams, P. | Control of insect infestation induced by solar heating of aerated farm silos. |
| 1650 | Bailey, S. W. | The use of nitrogen for insect control in stored cereals. |
| 1710 | Smith, L. W. and
Pratt, J. J. | The relationship of insect infestations to changes in the baking and taste properties of farinaceous foods. |

**SECTION 15 TROPICAL ENTOMOLOGY:
ANTS AND AGRICULTURE IN THE
TROPICS (I)**

Organizer: T. V. Bourke

Thursday, 24 August

Room M

Chairman: D. Leston

- | | | |
|------|---------------------------|---|
| 1400 | Cherrett, J. M. | A review of the pest status of leaf-cutting ants and their control. |
| 1420 | Lewis, T. | Foraging habits of leaf-cutting ants in Trinidadian citrus and cocoa fields. |
| 1440 | Lewis, T. | Aerial baiting to control leaf-cutting ants. |
| 1500 | Dias, D. | Polymorphism and colony population structure among tropical ants. |
| 1520 | Tea break | |
| 1550 | Baker, G. | The role of <i>Anoplolepis longipes</i> in the entomology of cacao in the Northern District of Papua New Guinea. |
| 1610 | Stapley, J. H. | Field studies in the use of the <i>Oecophylla</i> ant in the control of premature nutfall in the Solomon Islands. |
| 1630 | Collingwood, C. A. | Ants in relation to damage in West African cocoa farms caused by capsids. |

SECTION 15

TROPICAL ENTOMOLOGY:
ANTS AND AGRICULTURE IN THE
TROPICS (II)

Organizer: T. V. Bourke

Friday, 25 August

Room M

Chairman:

- | | | |
|------|----------------------|---|
| 1400 | Leston, D. | The ant mosaic: a basic property of the tropical forest zone. |
| 1420 | Greenslade, P. J. M. | Interactions between ant species and the composition of tropical ant faunas. |
| 1440 | Room, P. M. | A rational approach to control by ants of pest situations in tropical tree crops. |
| 1500 | Taylor, R. W. | |

SECTION 15

TROPICAL ENTOMOLOGY: GENERAL SESSION

Organizer: T. V. Bourke

Monday, 28 August

Room M

Chairman: C. A. Collingwood

- 1400 Benjamin, D. M. Bionomics of *Entypotrachelus myeri* and *E. micans*, indigenous forest weevils associated with tea in Kenya.
- 1420 Smith, E. S. C. Population fluctuations of the cocoa mirid in the Northern District of Papua-New Guinea.
- 1440 Bedford, G. O. Observations on dynastid beetles attacking coconut palms in the New Guinea region.
- 1500 Wood, B. J. The effect of pest damage on oil palm production.
- 1520 Tea break

Chairman: A. Wilson

- 1550 Wilson, A. G. L. The impact of supplementary crop irrigation on pest abundance in a dry tropical environment.
- 1610 Collingwood, C. A. Methodology of capsid spray trials on cocoa farms in Ghana.
- 1630 Owusu-Manu, E. Recent advances in the insecticidal control of cocoa mirids in Ghana.
- 1650 Shaw, M. J. P. and Munday, P. B. A ventilated protective suit for use with a back mounted mistblower in the tropics.
- 1710 Singh, Shiv Raj. Effect of Dimecron 100 ultra-low-volume aerial application on rice over a large area in Java.

SECTION 15

**TROPICAL ENTOMOLOGY:
INSECT PHENOLOGY IN THE
TROPICS**

Organizer: T. V. Bourke

Tuesday, 29 August

Room M

Chairman: J. C. de M. Carvalho

- | | | |
|------|-------------------|--|
| 1400 | Leston, D. | Fundamentals of tropical insect phenology. |
| 1420 | New, T. R. | Life histories of Psocoptera in the Mato Grosso, Central Brazil. |
| 1520 | Tea break | |

INSECT DIVERSITY IN THE TROPICS

Chairman: J. J. H. Szent-Ivany

- | | | |
|------|-------------------------|--|
| 1550 | Duckworth, W. D. | Distribution patterns and species diversity in the microlepidopterous family Stenomitidae. |
| 1610 | Medler, J. T. | Insect diversity in Nigeria. |
| 1630 | Whellan, J. A. | Diversity in form and colour in some Central African acridoids, and associated phenomena. |
| 1650 | Reddy, D. B. | |

CLOSING PLENARY SESSION

Wednesday, 30 August

Canberra Theatre

1015 hours

1. Opening by Dr S. L. Tuxen
2. Report of the Permanent Committee
3. Remarks by leader of the delegation from the host country for 15 Congress
4. Address by Professor J. S. Kennedy: "The Emergence of Behaviour"
5. Congress President closes meeting.

FILMS AND EXHIBITS

Organizer: R. W. Taylor

SCIENTIFIC FILM AND SLIDE PROGRAMME

Scientific film and slide programmes will be shown in the Theatre of the Forestry Building (Room P). Members whose films and slides are included in the programme must be present at the screening of their own contributions. A projectionist will be on duty to operate projection equipment.

FILM PROGRAMME NO. 1

Thursday, 24 August

Room P

1400	Oviposition in some crane-flies.	A. M. Hemmingsen
1410	Instincts of immature and adult Vermileoninae.	A. M. Hemmingsen
1430	Comportements interindividuels chez <i>Blabera craniifera</i> (Burm.).	G. Richard
1445	Bull ant warriors: an experimental study of aggressive behaviour.	P. L. Robertson and C. J. Orton
1510	An hypothesis on the effect of atmospheric small air ions and weather fronts on the emergence of <i>Wiseana cervinata</i> (Lepidoptera).	G. A. H. Helson
1520	Tea break	
1550	Comparative nesting behaviour of Australian <i>Bembix</i> wasps.	H. E. Evans and R. W. Matthews
1620	Insect tissue culture	CSIRO
1640	Swarming flies	P. Belton
1700	Swirling safeguard	J. Ardley

FILM PROGRAMME NO. 2

Friday, 25 August

Room P

1400	Her home is a hole — the story of the alfalfa leafcutter bee.	E. C. Klostermeyer and H. S. Gerber
1420	The death watch beetle.	S. A. Richardson
1440	Life cycle of the monarch butterfly.	L. D. Anderson
1450	The guardian.	R. W. Sherman
1520	Tea break	
1550	Insects versus alligator weed.	R. I. Sailer
1610	Colony founding in the ant genus <i>Manica</i> in a manner like that of the Australian <i>Myrmecia</i> .	G. Le Masne
1630	<i>Aedes</i> research in East Africa (1970).	G. A. H. McClelland
1710	Codling moth control by sterility principle.	M. D. Proverbs

FILM PROGRAMME NO. 3

Monday, 28 August

Room P

A series of films prepared by the CSIRO Film Unit, the Division of Entomology CSIRO and the Commonwealth Department of External Territories.

1400	Some current research activities in the Division of Entomology (1964).	
1425	The Termite colony (1972).	
1500	Embryonic development of the light brown apple moth.	
1550	The biological control of insects.	
1630	Dung Down Under — A study in biological control.	
1645	New Guinea.	

SLIDE PROGRAMME NO. 1

Wednesday, 23 August

Room P

- | | | |
|------|---|------------------------------------|
| 1400 | Succession of insect communities in the Bernina Glacier Region, Switzerland. | M. B. Kiauta |
| 1440 | Insect fallout on snowfields. | J. S. Edwards |
| 1500 | The species abundance distribution in stable and unstable communities of insects. | S. J. R. Birket-Smith |
| 1520 | Tea break | |
| 1550 | Aircraft disinsection — its history, status and future. | M. Laird and
W. N. Sullivan Jr. |
| 1630 | Australian injurious arthropods. | R. V. Southcott |

SLIDE PROGRAMME NO. 2

Tuesday, 29 August

Room P

- | | | |
|------|---|-----------------------------------|
| 1400 | Insect adaptation to a tropical rain forest environment: the nesting habits of euglossine bees. | D. Dias |
| 1440 | Some typical lerps of Australian Psyllidae. | K. L. Taylor |
| 1500 | Stereo scanning electron microscopy of insects. | B. K. Filshie and
C. D. Beaton |
| 1520 | Tea break | |
| 1550 | Semi-automatic factory rearing of Mediterranean fruit fly | J. Monro |
| 1610 | Lepidopteran leaf mines of the family Nepticulidae-Stigmellidae, with notes on their biology in Canada. | C. Wilkinson |
| 1630 | Morphogenese de la rape stridulante d'un Orthoptere Acrididae. | J. C. Lefeuvre |

EXHIBITS PRESENTED BY MEMBERS

The following exhibits will be presented in the *main laboratory* (Room R), Geology Building. They will be available for perusal from Tuesday, 22 – Friday, 25 and Monday 28 – Tuesday, 29 August between 0900 and 1730 hours.

DYNASTID BEETLES OF NEW GUINEA

G. O. Bedford

Pinned adult specimens and preserved larvae of the dynastids *Oryctes rhinoceros*, *O. centaurus*, *Scapanes*, *Trichogomphus* and *Xylotrupes* which attack coconut palms in New Guinea and the British Solomons are displayed.

A SELECTION OF PAPUA/NEW GUINEA INSECTS

Official exhibit by Department of Agriculture, Stock
and Fisheries, Papua/New Guinea

Subjects include: Characteristic insects of Papua/New Guinea, uncommon birdwing butterflies, examples of mimetic resemblance, *Pantorhytes* weevils, and intraspecific variation in New Guinea Lepidoptera.

THE FINE STRUCTURE OF THE INSECT DORSAL OCELLUS

L. J. Goodman and J. B. Kirkham

The organisation of the visual cell array and the first order synaptic layer of some insect dorsal ocelli is illustrated by means of silver stained sections and electron micrographs.

SCANNING ELECTRON MICROGRAPHS OF NEW ZEALAND PEST INSECTS

G. A. H. Helson and N. E. Flower

TIEG – TEEN INTERNATIONAL ENTOMOLOGY GROUP

Warren T. Johnson

AN ANT COUNTER FOR USE IN THE FIELD

T. Lewis and G. C. Dibley

A portable ant counter designed to distinguish between laden and unladen leaf-cutting ants (Attinae: Hym.) is displayed.

It counts foraging ants or the leaf fragments they carry along trails, in the tropical crops or forest, with an efficiency of 10-120% depending on the species of ant and the characteristics of the vegetation cut. The design could be modified to count other insects that habitually work along well-defined tracks.

ANTS FROM AUSTRALIA AND NEW GUINEA

Fr. B. B. Lowery S.J.

Exhibit includes: (1) Sixty species of *Myrmecia* (bulldog and jumper ants of Australia). (2) Mimicry in the bulldog ant *Myrmecia forceps* Roger. (3) Four examples of parasitism among Australian and New Guinean ants. (4) New Guinea Army ants (*Aenictus*). (5) Large colourful Ponerine genus, *Odontomachus*: species from New Guinea and Australia. (6) Two species of New Guinea *Aphaenogaster*: large colourful ants. (7) Ponerine genera of Australia. (8) Ponerine genera of New Guinea.

STUDIES ON THE *CULEX PIPIENS* COMPLEX IN WESTERN AUSTRALIA

H. E. Paterson, R. Irving-Bell and S. J. Miles

This exhibit is a photographic and graphical summary of the main lines of study on this complex being followed in Western Australia.

Part I: The Study of Reproductive Isolation between Members of the Complex. By H. E. Paterson.

In this Section the evidence for reproductive isolation between the four sympatric members of the complex is summarized. Photographs of apparatus and habitats will support the data.

Part II: Reproductive Genetics of *Culex molestus* Forskal. By R. Irving-Bell.

The work illustrated in this section deals with the ovarian cycle and with normal development and degeneration of oocytes. The studies include electron micrographs of microorganisms occurring symbiotically in the ovary and transmitted transovarically to successive generations.

Part III: Biochemical Genetics. By S. J. Miles.

Preliminary results on biochemical polymorphisms in the four sympatric species are to be presented in this part.

BIBLIOGRAPHY OF APHIDOIDEA, VOLUMES 1 AND II

Madan-Lal Sharma

SPECIAL EXHIBITS

There are several special exhibits which have been arranged in connection with the Congress and which will be of interest to members.

NATIONAL LIBRARY EXHIBIT

A display entitled "Insects and Man" has been organized by the National Library of Australia assisted by officers of the Division of Entomology, CSIRO. It is in the mezzanine foyer of the Library and deals especially with the role of insects, both native and introduced, in the Australian environment.

The Library is near Commonwealth Bridge on the south side of Lake Burley Griffin and is open 0900 – 2200 hours on weekdays and from 0900 – 1645 hours on Saturdays and Sundays.

A poster of modern design publicising the exhibition is available from the Library print shop.

EXHIBITS AT BLACK MOUNTAIN LABORATORIES OF CSIRO DIVISION OF ENTOMOLOGY

Members are welcome to inspect a series of special exhibits at these laboratories at any time between 0930 and 1630 hours on weekdays over the period of the Congress, and on 31 August and 1 September. Special arrangements may have to be made for visits to the Scanning Electron Microscope and Mass Spectrometry units but details of these will be included in the Daily Bulletin.

EXHIBITS PRESENTED BY THE DEPARTMENT OF NEUROBIOLOGY, AUSTRALIAN NATIONAL UNIVERSITY

The following exhibits will be presented in the Department of Neurobiology, Australian National University. They will be available for viewing between 1900 – 2200 hours on Thursday, 24 August and Monday, 28 August.

The superposition eye

G. A. Horridge

Nocturnal insects, many crustacea, and skipper butterflies have eyes with wide clear zones between the cone and receptor layers (rhabdoms). The dioptric apparatus of these eyes operates by a variety of mechanisms, including scattered light, light guides and an Exner-type superposition image. The topic will be illustrated with examples from a variety of clear zone eyes in an effort to form a comprehensive scheme of types of mechanism and their evolution.

Optical methods for studying the mechanisms of light transmission in insect eyes

G. Strange

An experimental setup has been constructed which allows quantitative measurements of the transmission of light through insect eyes to be made on a microscopical scale. For instance, many nocturnal insects show eyeshine, i.e., the incident light is partially reflected back by the tapetal layer. The directional distribution of eyeshine intensity allows some conclusions to be drawn about the optical properties of the eye.

Comparative ultrastructure of insect compound eyes

C. Giddings

Electron microscope studies reveal the diversity of the dioptric system and receptor layers in the insect compound eye and form a background to optical and physiological studies.

Structure and function of eyes of nocturnal beetles

B. Meyer-Rochow

Structural changes during light- and dark-adaptation in the eyes of various nocturnal beetles have functional consequences affecting the resolu-

tion and sensitivity of the eyes. These parameters are tested in optomotor experiments. Morphology and anatomy of the eyes are studied by light microscopy and transmission and scanning electron microscopy. Light paths within the eye and its dioptric system are constructed after refractive indices of the eye components have been measured interferometrically. Measurements of absorption of light of different wave lengths in the dioptric apparatus are made with an ultramicrospectrophotometer. These data allow us to compare the functional efficiency of the eyes of various species.

Intracellular recording from the retinula cells in a compound eye

B. Walcott

The apparatus and techniques used to record from visual cells in compound eyes will be demonstrated.

Physiology of insect photoreceptors and second order neurones

A. C. Ioannides

Neuronal connections in the visual neuropiles show a high degree of constancy and it is hoped that the physiological function of some centres can be described in terms of the interactions of known cell types. The responses from neurones in the lamina are being correlated with neuronal types by combining intra-cellular recording and intra-cullular dye injection techniques. Cells whose responses are known can then be correlated with cells described in anatomical studies. Responses from retinular cells and neurones in the lamina are illustrated.

Integrative properties of dragonfly second-order visual units

S. B. Laughlin

Apposition compound eyes, with their parallel system of inputs, promise to be a favourable system for a detailed analysis of information flow in a sophisticated visual integrator. By recording intracellularly from second order axons leaving the lamina, their properties can be examined and the amount of input convergence in the lamina analysed.

Optokinetic movements in locusts

J. Kein

A variety of visual stimuli, e.g. stripes, edges or flashes, evoke head movements in the locust. Stimulus parameters can be altered so that either arousal movements or true optokinetic responses can be seen. The demonstration will show activity of ventral nerve cord units while tiny stimuli evoke head movements of both types.

Statocyst induced eye movements in crabs

D. C. Sandeman and A. Okajima

Fast and slow phases of nystagmus are produced by irrigating the horizontal canals of the crab statocyst in isolated eye-brain preparations of the crab *Scylla serrata*.

Optic ganglia of crabs

P. Thomas

Microelectrodes in the optic ganglia of shore crabs show responses to movement and light flashes.

The action of drugs on crab motor neurones

F. Dunn

Blood vessels in the crab brain take drugs to within a few microns of the synaptic terminals between the interneurons and motor neurones in the brain. Inhibitory slow potentials in the eye retractor neurones are abolished by Picrotoxin at a dilution of 5×10^{-7} M.

Physiology and morphology of flight motor neurones

N. M. Tyrer

In the locust *Chortoicetes terminifera* the activity of identified neurones has been recorded with microelectrodes. By injecting fluorescent or electron dense dyes through the electrode, known neurones can be described, and their morphology correlated with their physiological properties.

The growth of the first visual projection of the blowfly

I. A. Meinertzhagen

The patterns of growth and development of the short retinula axons of the optic lobes of the blowfly *Calliphora* will be demonstrated from electron micrographs.

Development of the tympanum of Teleogryllus commodus in situ and in transplanted limbs

E. Ball

The development of the tympanum of *Teleogryllus* is being studied both

for its intrinsic interest and to provide a basis for the interpretation of transplantation experiments. The problem of neuronal specificity is being investigated by transplantation, in early instars, of the tympanum-bearing prothoracic leg to the other sites on the body. The hookups which the inward-growing tympanal nerve makes are then investigated anatomically and physiologically.

Development of flight in the locust Chortoicetes terminifera

J. S. Altman

Locust flight is a behavioural pattern which appears only in the adult and must require the addition of circuitry to an already functional nervous system. New synaptic connections must be formed, so the system offers excellent possibilities for describing the morphology and physiology of synapses as they become functional. The critical period for the formation of new connections has been determined by examining the establishment of flight pattern both behaviourally and by recording from the flight muscles. Changes in sense organs and in flight motor neurones are also described.

Specificity and regeneration in cockroach motor neurones

D. Young

This will illustrate how single motor nerve cells are identified and what sort of experiments are being used to study the specificity of their connection.

Innervation of the prothoracic legs of the praying mantis

E. Ball

The specialized morphology and function of the prothoracic legs of the praying mantis provide useful tools for the study of the rules by which nerves become appropriately connected during development and regeneration. The structure of the thoracic ganglia and the innervation of the leg muscles by specific identifiable motoneurones are currently being worked out. With this information it will be possible to investigate the reinnervation of particular muscles after transplantation of legs to different segments. Results from this work may be usefully compared with those of similar experiments in the cockroach (see D. Young: Regeneration of cockroach motoneurones).

Limb regeneration in crayfish

D. C. Sandeman and S. E. Luff

Removal of an eye in the crayfish usually leads to the regeneration of an uniramous structure resembling the outer ramus of the antennule complete with olfactory hairs. A similar result is obtained when a normal antennule is transplanted into the empty eye socket, except that in the latter case the regenerate is more often biramous. Central connections can be inferred by several behavioural tests.

Physiology of cicada song

D. Young

This will comprise illustrations of some of the larger and more unusual Australian cicadas with their songs and mechanisms of sound production.

Development of sarcoplasmic reticulum in embryos of the locust

Schistocerca gregaria

N. M. Tyrer

During the development of the muscles changes in the rates of contraction and relaxation can be related to ultra-structural changes in the sarcoplasmic reticulum.

COMMERCIAL EXHIBITS

Exhibits prepared by commercial organizations will be on view on week days during the Congress period from 0930 to 1730 hours in the laboratory in the Forestry Building (Room Q).

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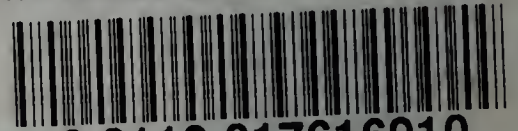
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Wednesday 23rd								
Thursday 24th								
Friday 25th								
Saturday 26th								
Sunday 27th		TEA				TEA		
Monday 28th								
Tuesday 29th								
Wednesday 30th								

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